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Definitions and Conventions of the 1972 Input-Output Study

Bureau of Economic Analysis Staff Paper

U.S. DEPARTMENT OF COMMERCE
Bureau of Economic Analysis

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Definitions and Conventions of the 1972 Input-Output Study

**by
Philip M. Ritz**

**JULY
1980**

**U.S. DEPARTMENT OF COMMERCE
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16. Abstracts This report, prepared for use with the 1972 input-output (I-0) study, is an update of similar reports prepared for the 1967 and 1963 I-0 studies. The basic text discusses I-0 as an accounting system, relates I-0 to the national income and product accounts, shows the mathematical system for developing total requirements tables, defines concepts, and explains conventions adopted for the study. Appendix A defines industries and commodities identified in the study. Appendix B provides methods and sources for preparing the 1972 I-0 tables.																			
17. Key Words and Document Analysis. 17a. Descriptors <table border="0"> <tr> <td>Input-output accounting</td> <td>Comparable and noncomparable imports</td> </tr> <tr> <td>Classification system</td> <td>Total requirements tables</td> </tr> <tr> <td>Secondary products</td> <td>Current and capital account</td> </tr> <tr> <td>Primary products</td> <td>Force account construction</td> </tr> <tr> <td>Industries</td> <td>Bills of goods</td> </tr> <tr> <td>Commodities</td> <td>Redefinitions</td> </tr> <tr> <td>Margins</td> <td>Reclassifications</td> </tr> <tr> <td>Valuation</td> <td></td> </tr> </table>				Input-output accounting	Comparable and noncomparable imports	Classification system	Total requirements tables	Secondary products	Current and capital account	Primary products	Force account construction	Industries	Bills of goods	Commodities	Redefinitions	Margins	Reclassifications	Valuation	
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PREFACE

Staff papers present reports on BEA research that is more specialized or less well established than BEA research generally made available to the public.

This paper was written by Philip M. Ritz, Chief of the Interindustry Economics Division. Important contributions were made by Howard L. Schreier, Economist, and Paula C. Young, Chief of the Input-Output Structures Branch. Other senior members of the Division staff were also very helpful in reviewing their areas of specialty and contributing suggestions and draft material.

Peggy L. Burcham provided all the typing assistance at the several stages of draft preparation and was responsible for producing camera-ready copy.

Definitions and Conventions of the 1972 Input-Output Study

I. Introduction

The 1972 input-output study

This report describes the benchmark input-output (I-O) study of the U.S. economy for 1972, prepared by the Interindustry Economics Division (IED) of the Bureau of Economic Analysis (BEA), U.S. Department of Commerce.

The study was released initially in two articles in the *Survey of Current Business (Survey)*, the monthly journal of BEA. The first article, in the February 1979 *Survey*, is "The Input-Output Structure of the U.S. Economy, 1972." The second article in the April 1979 *Survey*, is "Dollar-Value Tables for the 1972 Input-Output Study." The two articles appear in a combined reprint with the same title as the first article. 1/ These articles present the I-O tables at the 85-order industry/commodity level of aggregation. 2/

The 1972 I-O tables are also available in published form at the 496-order industry/commodity level. These are available in two volumes, each with the major title, *The Detailed Input-Output Structure of the U.S. Economy: 1972*. Volume I has the secondary title, *The Use and Make of Commodities by Industries*. Volume II has the secondary title, *Total Requirements for Commodities and Industries*. 3/

1/ Single copies of the reprint are available from U.S. Department of Commerce, the Bureau of Economic Analysis, Room 1009, Tower Building, Washington, D.C. 20230. Phone inquiries may be made on (202) 523-0683. Additional copies may be secured at \$3.25 per copy from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

2/ The first article shows the Use table (table 1) and the Make table (table 2) and certain auxiliary tables (tables A, B, C, D) in percentage terms. The direct requirements table (table 3) and the two total requirements tables (tables 4 and 5) are shown in coefficient form. The second article shows the Use and Make tables and the auxiliary tables in dollar terms. These dollar-value tables and the three coefficient tables make up the usual set of I-O tables, but the percentage tables make up the usual set of I-O tables, but the percentage tables in the first article are also useful for many purposes. For example, table 1 in the first article is useful for market analysis in that it shows the 1972 distribution of commodities to markets in percentage terms. Also, table 2 in the first article is useful for market analysis in that it shows the percentage of each commodity produced by each industry in 1972. This form of table is known as the "market share" table. The "constant market share" assumption, used in developing the total requirements tables, will be discussed later.

3/ These volumes are available from the Superintendent of Documents at \$8.50 for Volume I and \$7.50 for Volume II. The respective stock numbers are 003-010-00064-3 and 003-010-00065-1.

Volume I contains two parts. Part 1 is table 1, "The Use of Commodities by Industries, 1972," Part 2 is table 2, "The Make of Commodities by Industries, 1972," appearing two ways. Table 2A is "Industries Producing Each Commodity" and table 2B is "Commodities Produced by Each Industry." Volume II contains two parts. Part 1 is table 4, "Commodity-by-Commodity Total Requirements, 1972." Part 2 is table 5, "Industry-by-Commodity Total Requirements, 1972." Table 3, the direct requirements table, is not published at the 496-order level. If needed, the user can calculate it readily from the information in table 1.

The 1972 I-O tables were developed at the 496-order level and were also aggregated to the 365- and 85-order levels. The 365-order tables will not appear in published form. However, all sets of tables are available on computer tape and can be ordered from BEA. An order form for these and other tables deriving from the 1972 I-O study is available from IED. 4/

Differences from earlier studies: a summary 5/

The I-O tables for 1972 differ from the tables for earlier years in two major ways. First, the industry classification used is based on the *Standard Industrial Classification Manual 1972* (SIC), which was revised considerably from the 1967 version, upon which the 1967 I-O tables were based. Second, a change was made in the treatment of secondary products, following one of the procedures suggested by the United Nations in *A System of National Accounts* (SNA), Studies in Methods, Series F, No. 2, Rev. 3.

Other differences include changes in the handling of imports, the elimination of two dummy industries, the establishment of an eating and drinking places industry, and additional redefinitions of output for some industries. An important innovation is the establishment of the concept of "commodities" as having meaning in the intermediate (internal) portion of the table in addition to the usual concept of "industries." In general, a commodity is the primary product of an industry, plus the production of the same commodity by other industries as secondary output. The I-O code for the commodity is ordinarily the same as that for the industry. There are a few industries with no defined commodity output of their own; their output consists of commodities for which some other industry or industries are the primary producers, and all of the commodity output is assigned to the other industry or industries. In one case, the Commodity Credit Corporation (I-O 78.0300), the industry has no output and hence no commodity exists. There are two commodities for which there are no primary producers-- (1) imports and (2) scrap, used, and secondhand goods.

4/ Information on computer tape availability and costs may be secured by writing BEA-IED (BE-51), U.S. Department of Commerce, Room 1009, Tower Building, Washington, D.C. 20230, or calling (202) 523-0683.

5/ The differences between the 1972 I-O tables and earlier tables are discussed in detail in chapter VI.

Short history of I-O in the U.S.

The development of the I-O tool of economic analysis and the actual construction of the first I-O tables for the U.S. were the work of Wassily W. Leontief. Professor Leontief constructed such tables for 1919, 1929, and 1939. These tables appear in his book, *The Structure of American Economy, 1919-1939*, Second Edition, Oxford University Press, New York, 1951. The Bureau of Labor Statistics (BLS), U.S. Department of Labor, prepared an I-O table for 1947, which was released in 1952. These tables were not integrated with the national income and product accounts (NIPA's). BEA (formerly the Office of Business Economics) prepared tables that were integrated with the NIPA's for 1958, 1963, and 1967. These were published in the *Survey*. ^{6/} BEA revised the 1947 BLS study and reorganized it into a format consistent with the later BEA studies in a miscellaneous paper, "The Input-Output Structure of the United States Economy: 1947," March 1970, available on request from IED.

The BEA I-O program was instituted in the latter half of 1959 in response to a recommendation of the National Accounts Review Committee, which was set up at the request of the Bureau of the Budget to evaluate the national accounts work of the U.S. One of the principal recommendations of the Review Committee was that I-O accounts be prepared regularly as an important and integral component of the national accounts. ^{7/}

Assumptions of I-O analysis

Many of the uses of I-O involve the simplifying assumptions that the relationships established for the base year that link inputs (consumption of the products of supplying industries) to output will remain stable over time and through a range of output levels. This stability over time is usually called the proportionality assumption. ^{8/}

Such use of I-O does not rest on the belief that there is a strong theoretical validity to the assumptions of stability and proportionality. Rather, it stems from observation that change is a gradual process which requires considerable time before becoming sufficiently diffused to affect an industry's average I-O relationships appreciably.

^{6/} September 1965 (with related articles for 1958 in November 1964, May 1965, October 1965, and April 1966), November 1969 (with related articles for 1963 in October 1970, January 1971, April 1973, and November 1973), and February 1974 (with related articles for 1967 in February 1975, September 1975, and November 1977).

^{7/} The findings of this committee were published in the "National Accounts of the United States," Hearings Before the Subcommittee on Economic Statistics of the Joint Economic Committee, Congress of the United States, 1957.

^{8/} Of course, functional relationships between inputs and outputs may be developed that assume neither proportionality nor stability. There has been considerable developmental work on models that incorporate more sophisticated functional relationships.

Similarly, the argument for proportionality is that for most analytic uses of I-0 tables the stipulated change in output is relatively small. A small change in the output of an industry is unlikely to result in significant economies or diseconomies for most materials. Of course, for some inputs--particularly utilities and services--and for large changes in output, the proportionality assumption may be questionable. 9/

While further investigation of the stability of production requirements over time and at different levels of operation is needed, the stability assumptions appear tenable within reasonable time and operation levels. 10/ Many users of I-0 tables make adjustments to the coefficients before using them in a modelling system. These adjustments can be made to any extent deemed reasonable and desirable to reflect the projection period under consideration more properly. In such applications, it may be necessary to calculate a new set of I-0 tables, including the direct requirements (input) coefficients (table 3 in the 1972 set of I-0 tables) and the total requirements coefficients (direct and indirect requirements per unit of final demand--tables 4 and 5 of the 1972 I-0 tables). It may also be advisable to calculate new final demand bridge tables. (Bridge tables relate the detail of the final demand components of the I-0 tables to the detail of final demand in the NIPA tables.)

The stability (or instability) of I-0 relationships is affected not only by changing technology and by variations in output levels but by the organization and classification of the data in the I-0 table as well. For example, if an industry is defined to include heterogeneous and unrelated activities, shifts over time in the relative proportions of these activities can make the base year I-0 relationships inapplicable to other years. As a consequence, the achievement of stable input relationships was an important consideration influencing the choice of definitions and conventions discussed in later sections.

II. Input-Output as an Accounting System

A.--Input-Output and the National Income and Product Account

The 1972 I-0 table (like those for 1958, 1963, and 1967) is an integral part of the U.S. national economic accounts and is fully consistent with the national income

9/ For an evaluation of predictive capability of I-0 tables, see "Input-Output as a Predictive Tool," Arlene K. Shapiro, BEA Staff Paper No. 20, December 20, 1972. This is available from the National Technical Information Service, Springfield, VA 22161; \$8.00 per copy (\$3.50 microfiche), accession number COM 73-10146.

10/ See "Changes Over Time in U.S. Input-Output Relationships," Beatrice N. Vaccara, July 1969; a paper presented at the "Seminar on Input-Output Analysis," sponsored by the YMCA Center for International Management Studies and the State Planning Committee of Romania. A limited supply is available from BEA-IED (BE-51).

and product accounts (NIPA's). 11/ To understand the relationship between the two, it is useful to review briefly the national income and product (NIP) accounts proper, which is the centerpiece of the NIPA's. 12/

The NIP account presents the output of the national economy (gross national product, or GNP) both in terms of final product flows (the "product side") and in terms of income types and other charges against GNP generated in the production of this output (the "income side"). The major types of expenditure for final products are personal consumption expenditures (PCE), gross private domestic investment, net exports of goods and services, and government purchases of goods and services. The income types and other charges against GNP include compensation of employees (CE), proprietors' income, rental income of persons, corporate profits and inventory valuation adjustment, net interest, business transfer payments, indirect business tax and nontax liability, less the excess of subsidies over current surplus of government enterprises, and capital consumption allowances. Intermediate (as opposed to final) product flows, sometimes called current-account purchases, cancel out in the construction of GNP and are therefore not recorded in the NIPA.

In order to maintain the focus of the present discussions on the relationship between I-0 and the NIPA and to defer the treatment of several incidental issues, some simplifying assumptions will be invoked temporarily. First, GNP will be considered to be entirely of domestic origin. Second, it will be assumed that there is no change in business inventories. Third, it will be assumed that each industry produces one distinct commodity and that no other industry produces the same commodity.

The I-0 accounting system presents GNP both in terms of final product flows (final demand, in I-0 terminology) and in terms of charges against GNP (value added, in I-0 terminology). Both are broken down by industry. However, the distinctive feature of the I-0 approach is that it also comprehensively records interindustry current account transactions in intermediate products. 13/

The nature of the two accounting systems can be illustrated with a numerical example. For the sake of compactness, the product side is shown as comprising two components--PCE and Other Final Demand (O.F.D.); the income side will be shown as comprising two components--compensation of employees (C.E.), and Other Value Added (O.V.A.) and the business system will be divided into three industries, (A,B,C).

11/ There are some differences between the results of the 1972 I-0 study and the latest NIPA estimates for 1972 (which appear in the January 1976 *Survey*, entitled *The National Income and Product Accounts of the United States, 1929-74, Statistical Tables*). Benchmark revisions to the NIPA's are pending and will, when published, incorporate the estimates developed in the 1972 I-0 study. In turn, there will be other changes in the NIPA's, which will be incorporated in the 1977 I-0 study.

12/ For a more thorough explanation, see George Jaszi and Carol S. Carson, "The National Income and Product Accounts of the United States: An Overview," *Survey*, October 1979.

13/ The difference between current account and capital account is discussed on page 46.

The common antecedent of the I-0 account and the NIPA is an appropriately itemized version of the individual business unit's production account. In "T" configuration (a double column of figures, with debits in the left column and credits in the right column), it has this form:

Business Unit X	
Purchases from	Sales to
Industry A	Industry A
Industry B	Industry B
Industry C	Industry C
Compensation of	Personal Consumption
Employees (C.E.)	Expenditures (PCE)
Other Value Added	Other Final Demand
(O.V.A.)	(O.F.D.)
Expenses + Profits	Revenues

Since profits are equal to revenues less expenses and included in O.V.A., the debit and credit totals are equal. Also, note that a business unit can engage in current-account transactions with other units in its industry (as, for example, when parts and components are sold). Sales of capital goods from industry A to industry B are not recorded in B's purchases; they appear in O.F.D.

Essentially, the I-0 accounts are constructed by combining the production accounts for the business units in each industry, with no consolidation (that is, with intra-industry transactions recorded on both sides of the resulting account). A hypothetical example is:

Industry A			
Purchases from		Sales to	
Industry A	1.3	Industry A	1.3
Industry B	0.7	Industry B	2.1
Industry C	1.0	Industry C	1.0
C.E.	3.0	PCE	2.8
O.V.A.	<u>2.0</u>	O.F.D.	<u>0.8</u>
Expenses + Profits	8.0	Revenues	8.0

Industry B			
Purchases from		Sales to	
Industry A	2.1	Industry A	0.7
Industry B	2.9	Industry B	2.9
Industry C	1.0	Industry C	1.5
C.E.	1.0	PCE	2.2
O.V.A.	<u>1.0</u>	O.F.D.	<u>0.7</u>
Expenses + Profits	8.0	Revenues	8.0

Industry C			
Purchases from		Sales to	
Industry A	1.0	Industry A	1.0
Industry B	1.5	Industry B	1.0
Industry C	2.5	Industry C	2.5
C.E.	4.0	PCE	4.0
O.V.A.	<u>1.0</u>	O.F.D.	<u>1.5</u>
Expenses + Profits	10.0	Revenues	10.0

Note that each current-account (intermediate) transaction is recorded as a pair of counterentries, debited to the buyer and credited to the seller.

The NIP account is constructed by carrying out an additional step--consolidation of the industries. This involves both combination of the accounts for the three industries and the deletion of all entries involving current-account transactions, which would otherwise appear on both sides of the single account. In the example above, the result would be:

National Income and Product			
C.E.		PCE	
Industry A	3.0	Industry A	2.8
Industry B	1.0	Industry B	2.2
Industry C	4.0	Industry C	4.0
O.V.A.		O.F.D.	
Industry A	2.0	Industry A	0.8
Industry B	1.0	Industry B	0.7
Industry C	<u>1.0</u>	Industry C	<u>1.5</u>
Charges against GNP	12.0	GNP	12.0

The familiar summary form of the NIP account is then derived by simply dropping the industry detail. This would yield:

National Income and Product			
C.E.	8.0	PCE	9.0
O.V.A.	<u>4.0</u>	O.F.D.	<u>3.0</u>
Charges against GNP	12.0	GNP	12.0

The I-0 accounts are customarily presented in the form of a matrix rather than in a series of T accounts. The matrix contains one row for each industry and each value added component and one column for each industry and each final demand component. The entries from the T accounts are then inserted into the matrix, with the credits to an industry along the row corresponding to that industry and the debits to an industry

along the column corresponding to that industry. The two counterentries for each intermediate transaction will then coincide. The example above, in matrix form, is:

		Industries			Final Demand		Total	
		A	B	C	PCE	Other		
Industries	A	1.3	2.1	1.0	2.8	0.8	8.0	
	B	0.7	2.9	1.5	2.2	0.7	8.0	
	C	1.0	1.0	2.5	4.0	1.5	10.0	
Value	C.E.	3.0	1.0	4.0			8.0	12.0
Added	Other	2.0	1.0	1.0			4.0	
Total		8.0	8.0	10.0	9.0	3.0		
					12.0			

The example illustrates that the NIP account is a summary of the information conveyed by the I-0 accounting system. Because the I-0 accounts are conceptually and statistically integrated with the NIPA's, the measurement of total GNP and each of its components will be the same in the two sets of accounts. The detail of the accounts will differ, however. On the product side of the I-0 accounts, the detail for final demand is by commodity, whereas in the NIPA's other breakdowns are shown. The NIPA groupings for PCE and producers' durable equipment (PDE) are by various functional categories (e.g., food consumed at home) with no breakdown by commodity, as in I-0. Chapter VII provides a more thorough discussion of the "bridges" between the two sets of accounts.

With respect to charges against GNP, the NIPA's show the several components separately-- compensation of employees, proprietors' income, rental income of persons, corporate profits, net interest, indirect business taxes, etc. The I-0 tables included in the April 1979 report of the 1972 I-0 study show for each industry three summary components of "value added" as rows (employee compensation, indirect business taxes, and property-type income). The value added total for all industries as a whole is identical in the I-0 accounts and the NIPA's, but the industrial distribution differs. This variation is largely due to differences in the definition of the economic unit. In the I-0 table, the unit underlying the industry is generally the establishment and in some cases an activity. In the NIPA tables, the establishment is the unit for measuring labor income, but because of conceptual and statistical difficulties in estimating time series on an establishment basis, the company is the most feasible unit for measurement of property

income. Further differences arise because the I-0 table includes much more industrial detail than the NIPA tables and thus different data sources are used. 14/

B.--Input-Output Classification System

The classification scheme used for the 1972 I-0 study is based on the Standard Industrial Classification (SIC). 15/ The SIC, in turn is a system of definitions and guidelines for the grouping of establishments (defined, in the singular, as "an economic unit, generally at a single physical location, where business is conducted of where services or industrial operations are performed") into industries. 16/ An establishment is assigned to an industry according to its primary product or activity. The output of the industry is the sum of the outputs of the establishments so assigned to the industry. This output includes the primary production of these establishments (consisting, by definition, of characteristic products of the industry) and the secondary production of these establishments (consisting largely of characteristic products of other industries), but excludes characteristic products of the industry made as secondary production in establishments classified in other industries.

The I-0 tables utilize two different classification schemes--industry and commodity--each of which provides an exhaustive partitioning of the total output of the economy. 17/ The existence of secondary products of an establishment as classified under the SIC provides the crux of the distinction between the two schemes, leading to these initial definitions:

An I-0 industry is a grouping of establishments, as classified by the SIC.

An I-0 commodity consists of the characteristic products of the corresponding I-0 industry, wherever made. 18/

Under these definitions, there is a one-to-one correspondence between I-0 industries and I-0 commodities. Secondary products are the sole cause of divergence between the two classification schemes. In other words, if there were no secondary products, the output of each industry would be equal to the output of the corresponding commodity.

14/ The 496-order tables show value added as a total only. A forthcoming staff paper will show employee compensation and other items relating to employment at the 496-order level.

Value added has a different meaning in the reports of the Bureau of the Census. In such reports, value added is industry output less the cost of materials, purchased fuels and electricity, and contract work. Thus, Census value added exceeds BEA value added by the extent of purchased services and excise taxes collected by the manufacturer. Redefinitions may create other differences.

15/ *Standard Industrial Classification Manual 1972*, prepared by the Statistical Policy Division of the Office of Management and Budget.

16/ *SIC Manual 1972*, p. 10.

17/ The scope of the economy is as defined for GNP measurement purposes, but total economy output in the I-0 tables includes double-counting of intermediate products and thus has little or no significance as an aggregate for all industries.

18/ The term "commodity" is used for contrast with "industry." It is not intended to suggest either fungibility or tangibility.

The preceding discussion indicates the general nature of the dual classification scheme, but the definitions given require qualification and clarification. These elaborations will be grouped under three headings: (i) non-SIC classification, (ii) redefinitions and other modifications, and (iii) deviations from one-to-one correspondence.

- (i) Some segments of the I-O classification schemes are not based on the SIC approach. ^{19/} In agriculture and in construction, the establishment concept is not used. Instead, the products in each of these areas are grouped by type to provide the commodity classification; the industries conform to the commodities with only few exceptions mentioned in chapter I and on page 26 of II-F. In the case of government enterprises, production by publicly-owned entities is distinguished from otherwise comparable private activity.
- (ii) Modifications are made to SIC establishment and product groupings in order to arrive at the I-O industry and commodity definitions. Three types of modifications can be distinguished.

The first type of modification affects commodity classification but not industry classification. For example, the SIC defines the manufacture of cotton sheets from fabric made in the same establishment to be characteristic of SIC industry 2211 (I-O 16.0100), while cotton sheets made from purchased materials are considered characteristic of SIC industry 2392 (I-O 19.0200). I-O industry classification adheres to this definition, but I-O commodity classification groups all sheets together as part of commodity 19.0200. This type of modification typically increases the divergence between the industry and commodity classification schemes. It is necessary because the SIC sometimes makes distinctions on the basis of production arrangements (such as extent of vertical integration).

The second type of modification involves redefinitions, which affect industry classification but not commodity classification. For example, the output of the electrometallurgical products (SIC 3313) includes an estimate of sales of surplus electric power. The output of the corresponding I-O industry (37.0102) excludes these estimated sales, which instead are treated as part of the output of the electric utilities industry (I-O 68.0100). There is no adjustment to the I-O commodity classification--the distinction there between electricity and electrometallurgical products is unaffected. This type of redefinition typically decreases the divergence between the industry and commodity schemes. It is usually introduced for small, incidental items in an industry's output mix, especially when such an item is dissimilar to the industry's characteristic products.

^{19/} In the published concordances between SIC and I-O codes, rough SIC equivalents are presented for the sake of completeness.

The third type of modification is also a redefinition and it is symmetric in that it affects both industry and commodity classification. For example, the SIC manual states that the production of alumina is characteristic of industry 2819 (I-O 27.0100). However, in the I-O system alumina is classified as part of I-O commodity 38.0400 and the production of alumina in establishments assigned to SIC industry 2819 is included in the output of I-O industry 38.0400.

Taken together, redefinitions and reclassifications tend to sharpen the commodity concept by grouping like products together. ^{20/} However, they tend to blur the industry concept by carving up establishments.

- (iii) If the industry-commodity distinction were strictly a matter of establishments' secondary products, there would necessarily be a commodity corresponding to each industry. Due to departures from strict SIC classification in the I-O classification scheme, there are several industries for which there are no corresponding commodities, as noted on page 10. Furthermore, the commodity classification accommodates products that are not primary to any industry: noncomparable imports ^{21/} and scrap, used, and secondhand goods; for these categories, the industry concept is not meaningful. The accounting framework and the structural model adopted for the 1972 I-O study are both "rectangular" in that neither requires a one-to-one industry-commodity correspondence. Hence, aggregations and disaggregations which are asymmetric with respect to industries and commodities are possible.

This discussion of departures from strict SIC classification is incomplete. Specific descriptions of departures, indicating the scope of each individual industry and of each individual commodity, are given in chapter VIII.

The principles influencing the design of the I-O classification schemes will not be discussed here. An ideal system of I-O classification would have two properties: stability of proportionality coefficients and consistency with classifications used in data sources and other companion statistics. In practice, one is confronted with a trade-off between the two. The I-O industry classification represents a compromise, since the consistency property suggests strict SIC classification, while the stability property suggests extensive redefinitions to attain technological homogeneity.

^{20/} The I-O commodity classification scheme does not totally accomplish this. Many industries engage in productive activities that are incidental to their characteristic activities, but dissimilar in nature. In some cases, such incidental activities are classified with the primary products of the performing industry. For example, the oilfield service industry does some installation of oilfield equipment. In the I-O classification, this industry is grouped with producers of crude oil and natural gas (I-O 8.0000). Thus, the commodity produced by I-O 8.0000 includes an activity that is somewhat different from the other characteristic products of the industry. This kind of situation arises because the I-O commodity classification is, in most areas, derived from the industry classification (and from the underlying SIC) and is not a straightforward categorization of goods and services.

^{21/} An imported good or service is considered noncomparable if (1) there is no significant domestic production of similar products, (2) it is purchased and used outside the country, or (3) it is unique in character (e.g., used goods).

This discussion of classification concludes with a note concerning the relationship between the I-O classification schemes and the types of detail developed within the NIPA's. The NIPA's provide two main dimensions for disaggregation, type of income or charges against GNP (value added, in I-O terminology) and type of expenditure (final demand, in I-O terminology). ^{22/} It is sometimes helpful to think of value added (or its component types) as an extension of the I-O commodity classification scheme and to think of final demand (or its component types) as an extension of the I-O industry classification scheme. The reasons for these interpretations will emerge in the discussion of the I-O accounting framework (see II-C following).

C.--The I-O Accounting Framework

The earlier description of the I-O transactions table was intended to emphasize the integration of I-O and the NIPA's. Toward that end, the presentation abstracted from the industry-commodity distinction. However, the actual I-O tables make use of both the industry and commodity classifications. The accounting framework described above must be modified accordingly.

As before, there is a T account for each industry, and the debit side of such an account shows the industry's itemized expenses (including profit). Now, however, the purchased goods and services are classified by commodity, not by industry. The credit side presents the values of the various goods and services produced by the industry; also classified by commodity. ^{23/} Thus, the debit and credit sides respectively account for the inputs used and the outputs made by the industry. Note that there is no industry-classified detail within the T account for an industry, so suppliers (of intermediate goods and services) and customers are not identified. To continue the example begun above, T accounts for the three industries are:

IA: Industry A			
Goods and services used		Goods and services made	
1. Commodity A (CA.3) ^{24/}	2	5. Commodity A (CA.1)	5
2. Commodity B (CB.3)	1	6. Commodity B (CB.1)	3
3. C.E.	3		
4. O.V.A.	<u>2</u>		<u>—</u>
Input Total	8	Output Total	8

^{22/} A third dimension is gross product originating by industry. This is closely related to I-O on a conceptual level, but it poses some reconciliation problems at the statistical level.

^{23/} Typically, the characteristic products of the industry will dominate, but this is not always the case.

^{24/} The references in parentheses have no significance at this point in the discussion, and can be ignored until page 14. In the later T accounts, it will become clear that these are counterentries, similar to those used in the "Summary National Income and Product Accounts" in the July issues of the *Survey*. The initial C stands for commodity. The initial I (shown later) stands for industry.

IB: Industry B

Goods and services used		Goods and services made	
1. Commodity A (CA.4)	2	5. Commodity B (CB.2)	8
2. Commodity B (CB.4)	4		
3. C.E.	1		
4. O.V.A.	<u>1</u>		—
Input Total	8	Output Total	8

IC: Industry C

Goods and services used		Goods and services made	
1. Commodity A (CA.5)	1	6. Commodity A (CA.2)	5
2. Commodity B (CB.5)	2	7. Commodity C (CC.1)	5
3. Commodity C (CC.2)	2		
4. C.E.	4		
5. O.V.A.	<u>1</u>		—
Input Total	10	Output Total	10

The set of industry accounts does not provide a complete picture of product flows in the economy, for two reasons. First, the goods and services exchanged for final (as opposed to intermediate) expenditures are not recorded. Second, there are no counter-entries for intermediate flows; such counterentries are needed for consolidation into a summary NIP account. To complete the I-O system, it is necessary to set up a sources-and-disposition account for each commodity. The debit side of the account for a particular commodity will show the amount of that commodity made by each industry. ^{25/} The credit side will indicate the amount used by each industry and the amount absorbed by each component of final demand. Note that there is no commodity-classified detail with the T account for a given commodity, so the inputs used to produce the given commodity and the outputs to be produced from the given commodity (in the case of an intermediate good or service) are not indicated. To continue the example, T accounts for the three commodities are:

CA: Commodity A

Made by		Used by	
1. Industry A (IA.5)	5	3. Industry A (IA.1)	2
2. Industry C (IC.6)	5	4. Industry B (IB.1)	2
		5. Industry C (IC.1)	1
		6. PCE	4
		7. O.F.D.	<u>1</u>
Source Total	10	Disposition Total	10

^{25/} Typically, production of the commodity is characteristic of one industry, and that industry will dominate. However, this is not always the case.

CB: Commodity B			
Made by		Used by	
1. Industry A (IA.6)	3	3. Industry A (IA.2)	1
2. Industry B (IB.5)	8	4. Industry B (IB.2)	4
		5. Industry C (IC.2)	2
		6. PCE	3
		7. O.F.D.	1
	—		—
Source Total	11	Disposition Total	11

CC: Commodity C			
Made by		Used by	
1. Industry C (IC.7)	5	2. Industry C (IC.3)	2
		3. PCE	2
		4. O.F.D.	1
	—		—
Source Total	5	Disposition Total	5

Together, the industry and commodity accounts constitute the complete I-0 accounting system. The detailed entries can be separated into four groups:

- (1) final demand (GNP) - credited to commodity accounts
- (2) value added (charges against GNP) - debited to industry accounts
- (3) commodities used by industries - debited to industry accounts
- credited to commodity accounts
- (4) commodities made by industries - debited to commodity accounts
- credited to industry accounts

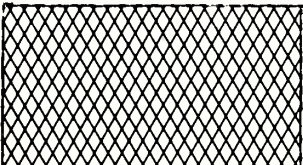
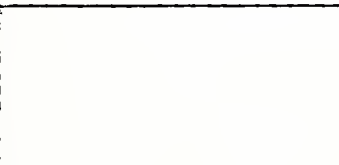
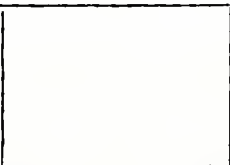
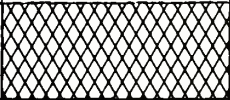
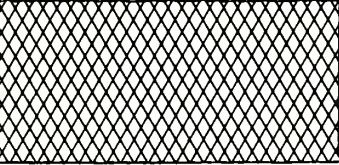
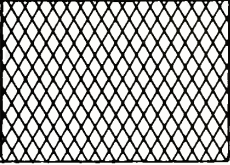
Groups (3) and (4) both consist of pairs of counterentries, which disappear in the process of consolidation. Thus, consolidation of the accounts gives the summary NIPA's, with GNP on the credit side and charges against GNP on the debit side. In the examples of industry and commodity T accounts, the references in parentheses indicate counterentries. The consolidated NIP account consists of debits and credits for which there are no such counterentries:

National Income and Product			
C.E.		PCE	
Industry A (IA.3)	3	Commodity A (CA.6)	4
Industry B (IB.3)	1	Commodity B (BC.6)	3
Industry C (IC.4)	4	Commodity C (CC.3)	2
O.V.A.		O.F.D.	
Industry A (IA.4)	2	Commodity A (CA.7)	1
Industry B (IB.4)	1	Commodity B (CB.7)	1
Industry C (IC.5)	<u>1</u>	Commodity C (CC.4)	<u>1</u>
Charges Against GNP	12	GNP	12

Note that this differs from the earlier example (page 7) only in the detail on the credit side. That is because final demand here is broken down by commodity rather than by industry. When the I-0 detail is aggregated, the same summary NIP account emerges:

National Income and Product			
C.E.	8	PCE	9
O.V.A.	<u>4</u>	O.F.D.	<u>3</u>
Charges Against GNP	12	GNP	12

I-0 accounts are generally presented in matrix form, rather than in a series of T accounts. The configuration for the 1972 U.S. I-0 table is represented by this figure:

	commodities	industries	final demand
commodities			
value added			
industries			

The entries from the T accounts are recast into the matrix by (1) arraying the credits to a particular industry or commodity along the row corresponding to that industry or commodity and (2) arraying the debits to a particular industry or commodity in the column corresponding to that industry or commodity. The paired counterentries will then coincide, thus eliminating redundancy. Note that entries will be recorded in only those four of the nine submatrices which have not been blanked out. In matrix form, the example developed above is:

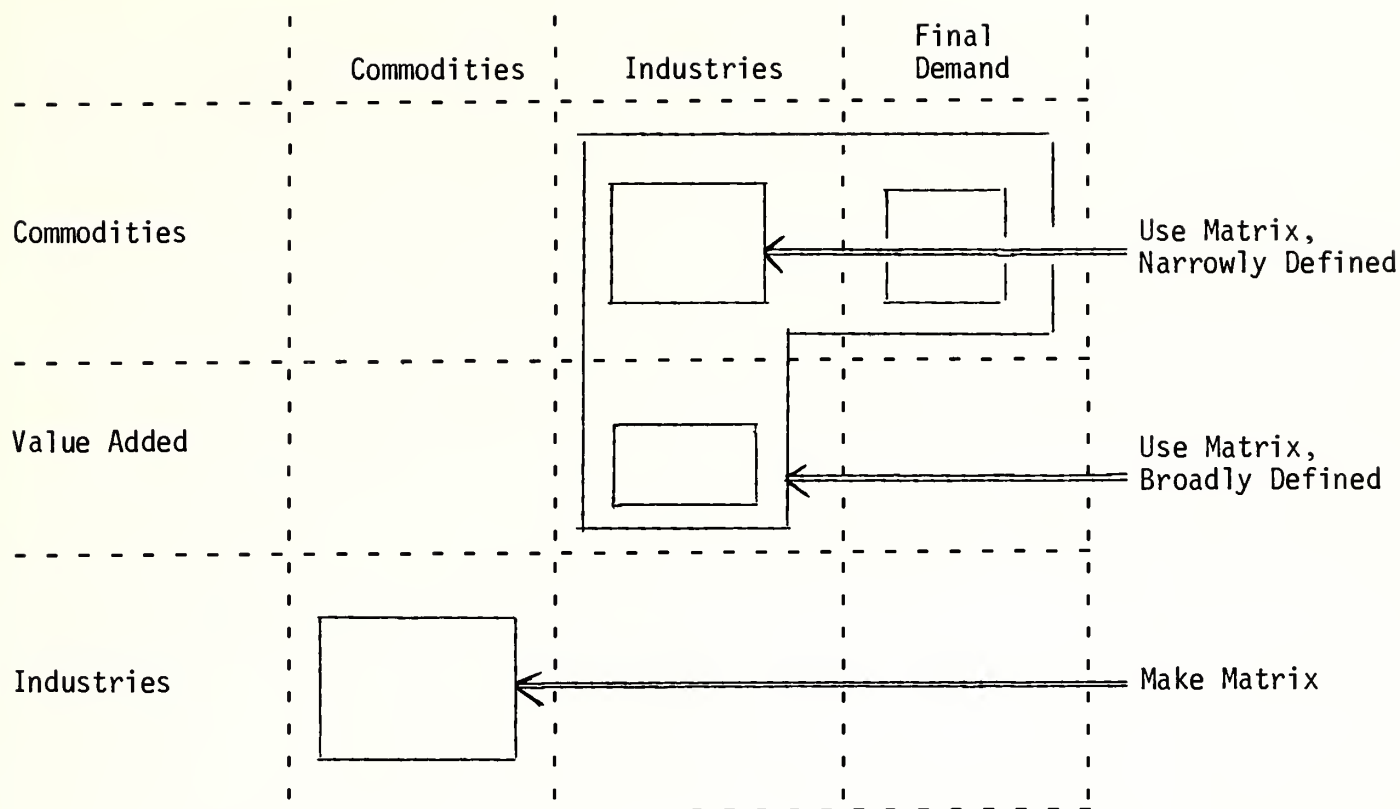
		Commodities			Industries			Final Demand		Total	
		A	B	C	A	B	C	PCE	Other		
Commodities	A				2 (IA.1) (CA.3)	2 (IB.1) (CA.4)	1 (IC.1) (CA.5)	4 (CA.6)	1 (CA.7)	10	
	B				1 (IA.2) (CB.3)	4 (IB.2) (CB.4)	2 (IC.2) (CB.5)	3 (CB.6)	1 (CB.7)	11	
	C						2 (IC.3) (CC.2)	2 (CC.3)	1 (CC.4)	5	
Value Added	C.E.				3 (IA.3)	1 (IB.3)	4 (IC.4)			8	12
	Other				2 (IA.4)	1 (IB.4)	1 (IC.5)			4	
Industries	A	5 (IA.5) (CA.1)	3 (IA.6) (CB.1)							8	
	B		8 (IB.5) (CB.2)							8	
	C	5 (IC.6) (CA.2)		5 (IC.7) (CC.1)						10	
Total		10	11	5	8	8	10	9	3		
								12			

The references in parentheses indicate the corresponding entries in the original T accounts. Totals are appended here to demonstrate the balance of the overall system. Note that

Commodity A row total
Commodity B row total
Commodity C row total
Industry A row total
Industry B row total
Industry C row total
GNP = Total value added

= 10 =
= 11 =
= 5 =
= 8 =
= 8 =
= 10 =
= 12 =

Commodity A column total
Commodity B column total
Commodity C column total
Industry A column total
Industry B column total
Industry C column total
Total final demand = GNP



The Make (output) matrix consists of entries that record the amount of each commodity made by each industry. The Use (input) matrix, narrowly defined, consists of entries that record the amount of each commodity used by each industry; it is partial in the sense that it excludes value added by industry and the absorption of commodities by final demand. These two quadrants are included in the Use matrix, broadly defined. In this context, it is often helpful to think of the industry and commodity classifications as being extended to include final demand components and value added components, respectively. See discussion on page 12.

D.--Non-Industry Sources of Commodities

There are sources of supply for many commodities in addition to the output of the industries; These are:

- (1) imports
- (2) withdrawals from business inventories
- (3) sales by general government (except construction) ^{26/}
- (4) in the case of scrap and used goods, sales by private producers on capital account and by consumers

Case (4) is similar in nature to case (3) and will not be discussed separately.

These additional sources of supply suggest an elaboration of the sources-and-disposition account for each commodity. The extended form is:

^{26/} See appendix A, page A-8, for a discussion of the treatment of construction activity in government.

Commodity X: Its Producers, Users, Inventory
Change, Imports, and Exports

Made by	Used by
Industry A	Industry A
Industry B	Industry B
Industry C	Industry C
.	.
.	.
Withdrawn from Business	Added to Business Inventories
Inventories	Exported
Imported	Purchased by Government
Sold by Government	Other Purchases by Final Demand
Source Total	Disposition Total

While this is theoretically valid, the treatment of inventories on a gross basis is both impractical and undesirable. Instead, net additions to business inventories are recorded on the credit (disposition) side. Similarly, sales by government (which arise both from production and from inventory reduction) are netted against government purchases, and imports are subtracted from exports. The result is a "sources-and-disposition" account of this form:

Commodity X	
Made by	Used by
Industry A	Industry A
Industry B	Industry B
Industry C	Industry C
.	.
.	.
	Added (net) to Business
	Inventories
	Exported
	less: Imported
	Purchased by Government (net)
	O.F.D.
Source Total	Disposition Total

The descriptions on the credit side are deliberately varied to reflect differences in the actual presentation of values in the I-0 table. Changes in business inventories, on the one hand, are inherently net. On the other hand, gross imports and gross exports are measured separately. Since this information is useful, it is preserved. General government transactions do not conform to either of these extremes, because sales are usually small and not a large part of total transactions. In the published I-0 tables, net purchases are recorded for each level and function of government.

Since the debits to the sources-and-disposition account appear in the Make matrix and the credits appear in the Use matrix (broadly defined), the netting of non-industry sources preserves the interpretation of the Make matrix while partially obscuring the meaning of the final demand quadrant of the Use matrix. The sources-and-disposition account for noncomparable imports becomes a special case; there are no entries on the debit side (and, therefore, no entries in the corresponding column of the Make matrix), while the positive and negative entries on the credit side (which appear along the corresponding row of the Use matrix) sum to zero. The result is the following:

Noncomparable Imports			
		Used by	
		Industry A	
		Industry B	
		.	
		.	
		Added (net) to Business	
		Inventories	
		Exported (Re-exports)	
		less: Imported	
		Other Final Demand	
Source Total	$\bar{0}$	Disposition Total	$\bar{0}$

E.--Wholesale and Retail Trade; Margins; Valuation

For I-0 purposes, the cost of a good that is subsequently resold by wholesale and retail traders is not included in the output of trade. Any attempt to record such transactions would obscure the technical relationships that are the intended focus of I-0. ^{27/} Still, it is necessary (1) to measure the services produced by wholesalers and retailers and (2) to account for the use of these services.

The output of wholesale and retail traders associated with merchandise sales is measured on what is termed a "gross margin" basis, by subtracting the cost of goods sold from the merchandise sales revenues. The I-0 account for the retail trade industry would thus have this form:

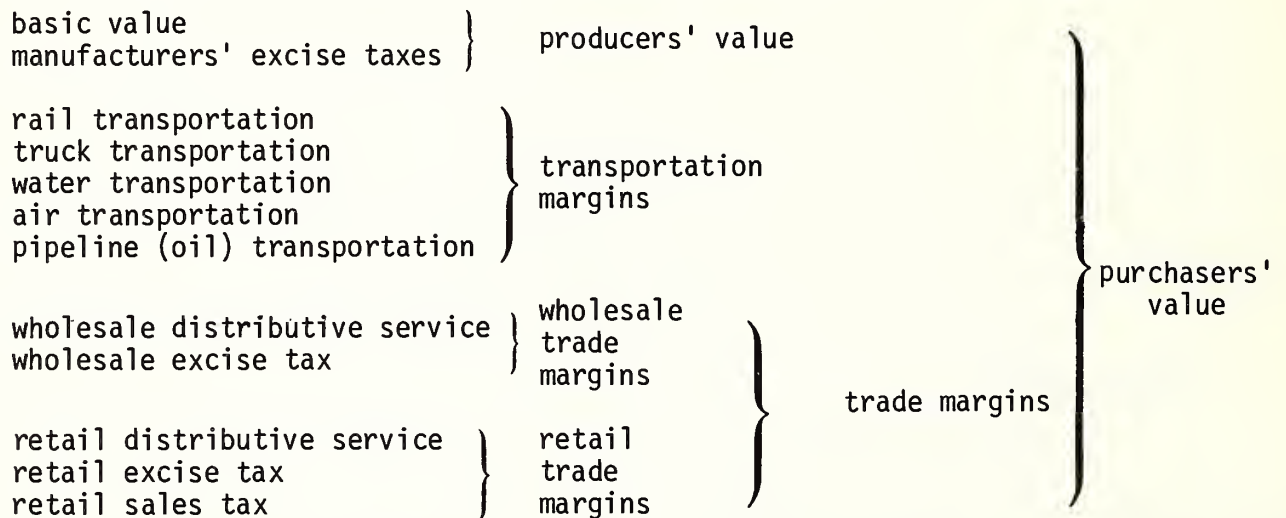
Retail Trade Industry			
Operating expenses + profits		Commodities made	
Commodities used in operations		Retail service	
Containers		Gross margins	
Wrapping materials		Merchandise sales revenues	
Business services		less: Cost of goods sold	
Rent, utilities, etc.		Other retail trade receipts	
Value added		Other goods and services	
Input total	_____	Output Total	_____

^{27/} However, inventory changes of traders, which arise when purchases and resales do not match over the accounting period, are incorporated in the inventory change component of final demand.

The account for the wholesale trade industry would be similar in appearance.

Accounting for the industrial and other use of gross trade margins needs explanation. The convention adopted for the I-0 tables is characterized by unbundling (recording the value of the trade margin separately, rather than incorporating it in the value of the merchandise) and forward-shifting (showing the trade margin as being used directly by the user of the merchandise).

Although the term "margin" originates in the analysis of wholesale and retail trade, it is also applied to other elements of cost, beyond basic production cost, which are incorporated in the delivered price charged to the purchaser of a good. For a domestically produced good, this purchasers' value is broken down as follows: 28/



Treatment of transportation margins in the Use and Make tables parallels that of trade margins. They are unbundled and shifted forward, regardless of who actually pays the costs (producer, wholesaler, retailer, or ultimate purchaser). In contrast to this, most taxes are treated as expenses at the point where they are actually collected and are incorporated into the value of the good (in the case of manufacturers' taxes) or

28/ Basic value represents the producers' value (at point of production, e.g., plant) excluding manufacturers' excise taxes, if any. Manufacturers' excise taxes are those levied directly on the manufacturer. The various transportation margins are the freight costs necessary to bring the good from the producer to the user, including trans-shipment, if any, by wholesaler or retailer to last user (either intermediate or final). The wholesale distributive service is that supplied by the wholesaler in the distribution of goods to users. If there is an excise tax levied directly on the wholesaler, it is added to the distributive service to become the total wholesale margin. Similarly, the retail distributive service is that supplied by the retailer in the distribution of goods to users. If there is an excise tax levied directly on the retailer, it is combined with the retail sales tax (if any) and the retail distributive service to become the total retail trade margin. The sum of producers' value, trade margins, and transportation margins is the purchasers' value.

the distributive margin (in the case of wholesale and retail taxes). ^{29/} These conventions are illustrated in the following example, which presents the estimated personal consumption of domestically produced cigarettes in the U.S. for 1972.

	Amount (\$ billions)	
Basic value	3.3	} 5.4
Manufacturers' excise tax	2.1	
Transportation	0.1	(all modes combined)
Wholesale distribution	1.3	} 3.9
Wholesale excise tax	2.6	
Retail distribution	1.2	} 1.6
Retail excise tax	0.2	
Retail sales tax	0.2	
Total	11.0	

The use matrix entries accounting for this transaction are:

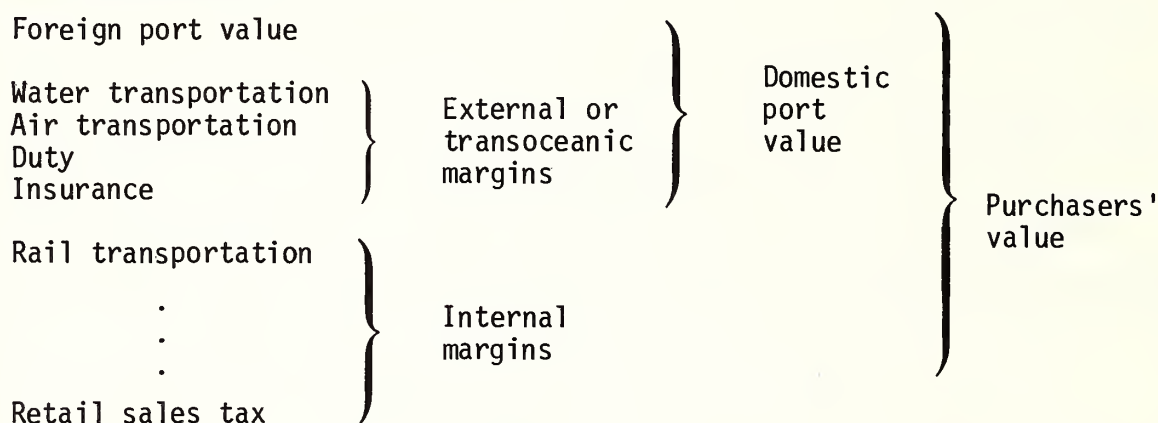
	Industries				Final Demand
Commodities	Cigarettes	Transportation	Wholesale trade	Retail trade	PCE
Cigarettes					5.4
Transportation					0.1
Wholesale trade					3.9
Retail trade					1.6
Value added					
Indirect business tax	2.1		2.6	0.4	

^{29/} There are a number of exceptions to this general rule. For example, retail taxes may be collected at the level of the manufacturer, the construction contractor, the mining establishment, or the wholesaler. These are all assigned to retail trade and added to the retail margin, along with regular sales taxes. Similarly, the wholesale tax on liquor is sometimes paid at the manufacturer's level. This is assigned to wholesale trade and is added to the wholesale margin. All taxes listed on page 20 are types of indirect business taxes (IBT).

The nature of the unbundling and forward-shifting convention is clear. Note that all of the transportation costs are shown as consumer purchases, even though some of them were incurred between the factory and the wholesaler. On the other hand, the values of output of cigarettes, wholesale trade, and retail trade incorporate the taxes collected from the three industries.

The published U.S. tables are said to be in "producers' prices" because the values for each good incorporate the costs incurred by its producers (including indirect business taxes) but not those involved in distribution and delivery.

For imported goods, the purchasers' value is broken down somewhat differently. The following scheme applies: 30/



The internal margins are treated like the similar margins that account for the difference between producers' value and purchasers' value of domestically produced goods. The transoceanic margins require further explanation. By convention, all duties are treated as if paid by the wholesale trade industry and thereby become a type of wholesale margin. For noncomparable imports, the four external margins (water, air, wholesale, insurance) are recorded with the usual unbundling and forward-shifting approach. For comparable imports, however, this would cause two types of difficulty:

- (1) For each user of a commodity, it would be necessary to split the amount used on the basis of origin (domestic or foreign). The Use matrix does not contain this type of information, so forward-shifting is not feasible.
- (2) The cells of the Use matrix would record varying mixes of domestic goods valued at producers' prices and imports valued at foreign port prices. The foreign port prices are likely to be lower, if the goods are to be competitive after the addition of importation costs. Hence, there would be inconsistency in valuation. This can be reduced by abandoning the unbundling convention for the external margins and recording the use of comparable imports in terms of domestic port values.

30/ Foreign port value represents the value of the commodity at the foreign shipping point. Domestic port value is the foreign port value plus external or transoceanic margins, including water transportation (ocean shipping), air transportation (freight), duty (assigned to wholesale trade), and insurance on overseas shipping. Domestic port value tends to approximate the producers' value of the comparable domestic commodity.

Accordingly, the external margins on comparable imports are handled in the following manner:

- (1) The import component of final demand is shown as the "purchaser" of the margin services.
- (2) The negative "purchase" of the specific good in question by the import component of final demand is measured in terms of domestic port value.

Thus, the column total of this import component (which appears as a negative) reflects the foreign port value of all imports.

Two examples will be presented to illustrate the margin conventions for imports. To abbreviate the presentation, the transportation modes are combined into one industry/commodity, as are wholesale and retail trade.

The first example involves a noncomparable import used by Industry A. Note that for this example the noncomparable import value that is recorded is the foreign port value of the imported commodity. It does not matter whether transoceanic transportation is by domestic or foreign carrier, or a combination of both. Foreign transportation is a comparable import.

<u>Cost element</u>	<u>Amount</u>
Foreign port value -----	50
Transoceanic margins	
Transportation -----	8
Duty -----	7
Insurance -----	1
Internal margins	
Transportation -----	3
Trade -----	<u>11</u>
Purchasers' value -----	80

The Use matrix entries directly attributable to this transaction are:

	Industry		Final Demand	Total
Commodity	A	Trade	Gross imports	
Transportation	8+3			11
Trade	7+11			18
Insurance	1			1
Noncomparable imports	50		-50	0
Value added (IBT)		7		
Total	80			

The second example involves a comparable import--Commodity B. The breakdown of domestic port value is:

<u>Cost element</u>	<u>Amount</u>
Foreign port value -----	30
Transoceanic margins	
Transportation -----	8 (5 by foreign carriers, 3 by domestic)
Duty -----	6
Insurance -----	<u>1</u>
Domestic port value -----	45

The Use matrix entries that account for this import are:

	Industry	Final demand	Total
Commodity	Trade	Gross imports	
Trade		6	6
Transportation		8-5	3
Insurance		1	1
B		-45	
Value added (IBT)	6		
Total		-35	

Note that the import column total presents the value of all imports (30 of commodity B at foreign port value and 5 of transportation) and that the row totals for the margin-type services represent domestic output. The distribution among users of commodity B and the associated margins are not shown because, for that aspect of the accounting, imports and domestic production are pooled and the origin of the commodity is not relevant. (See pages 17 and 18 for further explanation.)

Other margins

Margin services are also produced in general government (because of sales) and can also, in effect, be withdrawn from inventories. ^{31/} To account for these sources, negative margins are recorded in the general government and inventory change components of final demand. This contrasts with the treatment of imported margin services, whose origin is accounted for with negative non-margin entries.

F.--Industries and Commodities and Gross Output Concepts

The BEA I-O tables for 1972 represent cross-tabulations of transactions in the total U.S. economy in terms of both industries and commodities. Commodities may have the same I-O numbers and titles as I-O industries, but there are certain important differences between the two which must be distinguished.

An industry is a collection of establishments producing the same primary commodity, which consumes products and services (commodities) and value added and produces products and/or services (commodities) which differ in nature from those it consumed. For purposes of I-O, trade and transportation, which provide distribution services for products but do not change their nature very much, are also classified as industries, because they provide services and are not final demand users of the products they help distribute.

The trade and transportation industries are often referred to as margin industries, but some of them also produce relatively small amounts of output that are not margins. For example, in trade, services of agents and brokers are allocated directly to consuming industries as costs rather than as margins associated with the purchase of goods. In transportation, passenger services, freight services not involved in the movement of goods between producers and consumers (e.g., movement of household goods), warehousing, and other services incidental to transportation are sold directly to users.

An industry is usually defined for statistical purposes on the basis of its definition in the *SIC Manual* (e.g., the 1972 edition was used for the 1972 I-O table). An I-O definition is either a four-digit SIC or some combination of SIC's. In a few cases, such as for construction and agriculture, the SIC definition does not help very much in identifying the I-O industries, which are defined differently. Thus, the construction industries are identified by type of construction and the agricultural industries by product or service. The associated SIC's are shown only for completeness in the concordance of I-O with SIC.

^{31/} Inventories of goods embody margins if the associated services were rendered before the goods were stored. Thus, for example, tires held at an automobile assembly plant would include margins in their value, while an otherwise identical stock held at the tire factory would not.

In general, an SIC industry is identified by its major product or products called its primary product or primary service. These are also called "characteristic products" in Section II-B. The SIC defines the industry in terms of a given product that accounts for a plurality of its total output. In most instances, the bulk of the product or service comes from the primary producing industry (i.e., the industry which is the primary producer of the product), but in a few instances the majority of the product may be produced by one or more other industries. Other production of an SIC industry, other than scrap, is called secondary production and may include more than one secondary product. Each secondary product is also the primary product of some other SIC industry. This distinction between primary and secondary products is carried through in the Census of Manufactures and other economic censuses and a similar distinction is carried through to the I-O industries.

The primary product of an industry is called a commodity in the I-O system. ^{32/} All secondary production by other industries of the same commodity is considered part of the total output of that commodity. The commodity is usually given the same I-O code as the primary producer of the commodity. There are some exceptions to this procedure. For example, a product may be produced in large quantities in more than one industry. The decision as to where it is to be placed for I-O purposes may also depend on such factors as similarity with the primary product of another industry. Thus, petroleum feedstocks are classified by the SIC in the petroleum refinery industry (2911), even though the bulk of the item is produced in chemicals (SIC 286). In I-O, the feedstocks are reclassified and made secondary to the petroleum refining industry and become a primary commodity of the basic chemicals industry. In other instances, the entire output of an industry is included with the primary commodity of another industry. Also, one industry (Commodity Credit Corporation) is defined to have no output and hence there is no commodity.

Thus, in the 1972 I-O study the following industries had no associated commodity:

- I-O 2.0701 - Forest products
- I-O 78.0200 - Federal electric utilities
- I-O 78.0300 - Commodity Credit Corporation
- I-O 79.0100 - Local government passenger transit
- I-O 79.0200 - State and local electric utilities

With these five categories excluded, the 496-order tables for 1972 have only 491 commodities. Also, there are two commodities with no counterpart industries--noncomparable imports (I-O 80.0000) and scrap, used, and secondhand goods (I-O 81.0000). Thus, the 496-order classification system for 1972 contains 494 industries.

Industry output is defined in the gross sense, which means that it includes current consumption of its own primary products (commodities) as well as the commodities of other industries. Thus, gross output of an industry is equal to the sum of all inputs, including value added. The gross output of an industry is also the value, in producers' prices, of the goods and services produced (as opposed to "sold" or "shipped") by the industry during the year. The gross output of a commodity is the value, in producers'

^{32/} The primary product of an industry is the composite of all the products considered primary to the industry. The commodity with the same I-O designation is this composite of primary products.

prices, of the goods and services that constitute that commodity produced by all industries during the year; it thus excludes supplies of the commodity from non-industry sources (imports, withdrawals from business inventories, and sales by general government). The 50 different construction industries are so defined that gross commodity output and gross industry output are identical. This is because no construction industry produces any secondary products and also "force account" construction of other industries (construction performed by their own work forces) is defined as part of the appropriate construction industry. In this sense, the establishment that does force account construction is cut up to exclude all of its construction activity from its output. This procedure is explained more fully in a later section.

It should be understood that the use of gross in the I-0 accounts has a different and broader meaning than it does in gross national product (GNP), because it indicates the inclusion of intermediate goods and services as well as capital consumption in the measure of production. Thus:

Gross output of industry X
Less: Intermediate goods and services used by industry X
Equals: Gross (National) Product originating in industry X
Less: Capital consumption in industry X
Equals: Net (National) Product originating in industry X

Values of products that are made and used in the same establishment (i.e., produced and consumed commodities) are not, in general, recorded in the I-0 accounts. Exceptions arise where the industry classification scheme subdivides establishments, or what might be considered establishments. For example, railroads engage in the maintenance and repair of their own facilities--a construction activity. If the I-0 accounts treated this activity as if performed in the same establishment as that which provides rail transportation, it would not be incorporated in the gross output of any industry or commodity. Actually, the classification scheme is modified to treat this force account activity as part of the construction industry. As a direct consequence, the gross output levels of both the construction industry and the construction commodity are increased by the value of maintenance and repair performed. Note that there are two distinct consequences of this change in the treatment of force account construction. The first is a shift of activity from transportation to construction and the second is an increase in aggregate recorded output.

Types of industries

a. Producing industries

A producing industry buys products and/or services from other industries and uses (consumes) them, together with the services of labor and capital goods, to produce other products and/or services. These, in turn, are sold for consumption to other intermediate industries or to final users in the economy (households, investors, governments, foreigners) or may appear as changes in the inventories of the producer or the purchasers.

Examples of "producing" industries include industries in manufacturing, mining, agriculture, trade, transportation, utilities, services, and government enterprises. The term is also used to identify the industry in which a product or service (i.e., commodity) originates, whether or not the industry is the primary producer of the commodity. Thus, an establishment in a producing industry will produce commodities that are primary to the industry (i.e., the industry that is the primary producer), and it may also produce output which is secondary to its industry but primary to some other industry. The term producing industry is useful also to distinguish the production (or sales) activities of an industry from its consumption (or purchasing) activities. The term consuming industry is used in the latter case; it consumes the commodity output of producing industries (and value added).

b. *Special industries*

These industries are defined in a way that insures that certain aggregate estimates will be consistent with those in the national income and product accounts. These entries permit ready derivation of certain components of GNP from the data in the transactions table. The industries involved are Government industry (I-0 82.0000), Rest of the world industry (I-0 83.0000), Household industry (I-0 84.0000), and Inventory valuation adjustment (I-0 85.0000). Each has a corresponding commodity.

(1) *Government industry*

In the I-0 presentations, the column for this industry contains a single entry, in the value added row, representing compensation (wages and salaries plus supplements) of employees in general government, other than force account construction workers. (In the I-0 accounts, government force account construction is defined as part of the construction activity; in the NIPA's, payments to force account construction workers are included in government, thus becoming part of "gross government product.") The row entries appear only in the government columns, representing employee compensation paid by each government sector for services rendered by employees. Note that government enterprises are part of the private sector and not part of general government. They are discussed in appendix A.

(2) *Household industry*

The column for this industry contains a single entry, in the value added row, representing employee compensation of household workers, such as maids, chauffeurs, and baby sitters. There is an identical row entry in the PCE column representing the payment for the services by households.

(3) *Rest of the world industry*

In the NIPA's, the output of the rest of the world industry is measured by the value of output produced outside the U.S., but accruing to U.S. residents, less output produced in the U.S. but accruing to foreign residents.

The value of output produced outside the U.S. but accruing to U.S. residents is measured by: (a) compensation of U.S. residents working in the U.S. for foreign governments or international organizations, (b) earnings of U.S. residents working abroad, and (c) receipts of income on foreign investment. Output produced in the U.S. but accruing to foreign residents is measured by: (d) wages and salaries paid to foreigners working in the U.S. and (e) private payments of income on foreign assets.

The inputs into I-0 83.0000 (the column entries) conform with the NIPA definition of this special industry. Compensation paid U.S. residents (a and b above) is netted against wages and salaries paid to foreigners (d above) and entered in the "Compensation of employees" row. Similarly, receipts of income on foreign investment (c above) are netted against payments of income on foreign assets in the U.S. (e above) and entered in the "Property-type income" row.

The sum of these two column entries is equal to the value of the rest of the world industry in the NIPA's. 33/

On the row side of the I-0 table, I-0 83.0000 reflects not only U.S. income and product originating in the rest of the world, but, to avoid double counting, also certain required offsetting adjustments between PCE and gross exports and between Federal Government and gross exports. The row for I-0 83.0000 is used for this adjustment simply as an expediency. Those export items included in PCE are: travel expenditures in the U.S. by foreigners; expenditures in the U.S. by foreign residents working for foreign governments and for international organizations operating in the U.S.; expenditures by other foreign workers working in the U.S.; expenditures in the U.S. by foreign crews; and remittances-in-kind. The sum of these is shown as a negative entry in the PCE column at row 83.0000.

Similarly, general government sales included in exports and Federal Government (e.g., NASA, AEC, etc.) are combined and shown as a negative entry in the Federal Government column at row 83.0000.

These two values (PCE and Federal Government) are added as positive entries to the income items in (a), (b), and (c) above and entered in the exports column at row 83.0000, and the sum of (d) and (e) above is shown as a negative entry in the imports column at row 83.0000.

The sum of the row entries is equal to the value of the rest of the world industry in the NIPA's.

The above discussion of the rest of the world account can be expanded by providing some definitions and then showing how the account was built up in 1972, using the actual I-0 data for that year. The NIPA's are based on

33/ Excluded from both the NIP and I-0 accounts are:

On the export side--reinvested earnings of incorporated affiliates of U.S. direct investors.

On the import side--reinvested earnings of incorporated affiliates of foreign direct investors.

a definition of the economy as being comprised of the economic activities of U.S. residents within and outside the U.S. An alternative definition might have the economy comprised of economic activities taking place within the boundaries of the U.S. This definition leads to gross domestic product rather than GNP as the measure of final output.

The distinction between these concepts provides the basis for breaking value added into two components:

- (1) Value added arising in the production of goods and services within U.S. boundaries, and
- (2) Services provided to foreigners by factors of production owned by residents of the U.S. (exports), net of the services provided to the U.S. by factors of production owned by residents of foreign countries (imports).

In the I-0 accounts, the second component is debited to the rest of the world industry and the first component is debited to the other industries. For 1972, the income flows arising from the international trade in factor services were as follows:

	(Millions of dollars)		
	Exports	Less imports	Equals net exports
Employee compensation -----	278	230	48
Property income -----	10,161	3,291	6,870
Total -----	10,439	3,521	6,918

The imports and exports of factor services appear on the credit side of the rest of the world commodity account. This results in the following group of entries in the I-0 tables:

Rest of the world, part 1 of 3
(Millions of dollars)

		Commodities	Industries	Final demand			TOTAL
		ROW			Exports	Imports	
Commodities	ROW				10,439	-3,521	6,918
Value added	Emp. Comp.		48				48
	PTI		6,870				6,870
Industries	ROW	6,918					6,918
TOTAL		6,918	6,918		10,439	-3,521	

The distinction between the residential and within U.S. boundary concepts also affects the scope of PCE. PCE can be viewed as consisting of three components:

- (1) Purchases of consumer goods and services within U.S. boundaries,
- (2) Foreign travel and expenditures abroad by U.S. residents,
- (3) Less: Expenditures in the U.S. by foreigners and personal remittances in kind to foreigners.

Component (3) is recorded as a negative credit in the rest of the world commodity account, with an offsetting positive credit for exports. Components (1) and (2) are credited to the other commodity accounts.

For 1972, the entries for component (3) are as follows:

Rest of the world, part 2 of 3
(Millions of dollars)

		Commodities	Industries	Final demand			TOTAL
					PCE	Exports	
Commodities	ROW				-3,525	3,525	0
Value added							
Industries							
TOTAL					-3,525	3,525	

Net sales by general government (see page 18) are recorded in the I-0 tables as negative purchases. Some nondefense services sold to foreigners by the Federal Government in 1972 could not be readily classified by commodity. For expediency, the offsetting credit entries (negative for Federal Government purchases, nondefense; positive for gross exports) were recorded in the rest of the world commodity account. The entries were as follows:

Rest of the world, part 3 of 3
(Millions of dollars)

		Commodities	Industries	Final demand			TOTAL
					Exports	Federal Gov't Purch.	
Commodities	ROW				203	-203	0
Value added							
Industries							
TOTAL					203	-203	

Note that this segment of the rest of the world commodity account does not arise from the necessity of reconciling the residential and U.S. boundary concepts.

Finally, the published I-0 rest of the world accounts can be derived by adding together the three segments shown above. The result is:

Rest of the world, all parts
(Millions of dollars)

		Commodities	Industries	Final demand					TOTAL
				PCE	Exports	Imports	Federal Gov't Purch.		
Commodities	ROW			-3,525	14,167	-3,521	-203		6,918
Value added	Emp. Comp.		48						48
	PTI		6,870						6,870
Industries	ROW	6,918							6,918
TOTAL		6,918	6,918	-3,525	14,167	-3,521	-203		

(4) *Inventory valuation adjustment (IVA)*

IVA is a component of the NIPA's which offsets the effects of historical cost inventory accounting. In the NIPA's, goods and services are valued according to their current-period prices. Historical cost inventory accounting admits prices from earlier periods. This introduces an inconsistency, necessitating the IVA. ^{34/}

^{34/} See *Survey*, January 1976, Part I, page 34.

On the product side (final demand), IVA pertains to the change in business inventories (CBI). On the income side (value added), it pertains to profit-type incomes.

In I-0, IVA is segregated as a special industry/commodity (I-0 85.0000), although this is not theoretically appropriate. ^{35/} This treatment of IVA cannot accommodate the two different estimates of IVA in the NIPA's, which are applicable to CBI and to profit-type incomes, respectively, as discussed in the *Survey*, January 1976, Part I, page 19. Instead, the value added entry for the IVA industry contains the IVA estimate from the NIPA's, which is applicable to CBI, and the difference between the two IVA estimates is incorporated in the value added entries for the other I-0 industries (in much the same way that the statistical discrepancy from the NIPA's is incorporated in I-0 value added).

III. Description of the 1972 I-0 Tables

The results of the 1972 I-0 study are presented in five basic tables. They are: (1) Use table, (2) Make table, (3) commodity-by-industry direct requirements table, (4) commodity-by-commodity total requirements table, and (5) industry-by-commodity total requirements table.

1. *The Use table (table 1).*--This table shows in each row the value of the commodity named at the beginning of the row used in production by each industry or purchased by final users. Each column shows the value of the commodities used in production by the industry named at the head of the column and the value added generated in production. The final demand columns show the purchases of commodities by each final user, including net inventory change. The row sum equals total commodity output. The column sum equals total industry output.
2. *The Make table (table 2).*--When presented in matrix form (as in the April 1979 *Survey* article), the table shows in each row the values of the various commodities produced by the industry named at the beginning of the row. The entry in the main diagonal (i.e., where the row with a given industry/commodity code intersects the column with the same code) is the value of the primary product of the industry. The other entries in the row are the values of secondary products produced by the industry. (The category scrap, used, and secondhand goods is identified only as a commodity; there is no corresponding industry.) Each column shows the amount of the commodity named at the head of the column that is produced in each industry. The column sums equal total commodity output and the row sums equal total industry output.

^{35/} Instead, the CBI entry for each I-0 commodity should reflect the change in inventories of that commodity in terms of historical cost accounting plus the associated portion of the IVA. Similarly, the value added for each industry should incorporate the profits of that industry measured on the basis of historical cost accounting plus the associated portion of IVA.

In the detailed 496-order publication (Volume I, Part 2), the Make table appears in different format, in order to save space. Table 2A shows the industries producing each commodity and table 2B shows the commodities produced by each industry. Thus, the zero cells in the Make table are not shown.

3. *The commodity-by-industry direct requirements table (table 3).*--This table shows in each column the inputs required by the industry named at the head of the column to produce a dollar of that industry's output. It should be noted that these input coefficients include purchases (if any) of noncomparable imports at foreign port value (I-0 80.0000) and scrap (I-0 81.0000). Table 3 was not published at the 496-order level. The coefficients can be calculated readily from data in table 1.
4. *The commodity-by-commodity total requirements table (table 4).*--This table shows in each column the production required both directly and indirectly of the commodity named at the beginning of each row per dollar of delivery to final demand of the commodity named at the head of the column. Following the example on page 42 of the February 1979 article, in order to provide consumers with \$1.0 million of household furniture (I-0 22), \$1,004,900 (\$1.0 million x 1.00490) of household furniture products is required (row 22) and \$207,260 of lumber and wood products \$1.0 million x 0.20726) is required (row 20), and so on for other commodities. It will be noted that the demand which is generated is for commodities, not industries. The method by which the total requirements coefficients are calculated is explained in chapter IV.

At the 496-order level, table 4 is a 487 by 487 square matrix, with the following omitted, either because there were no associated commodities (see the list on page 26) or because they were special industries (I-0's 82.0000 - 85.0000) which would have ones in the main diagonal and zeroes elsewhere.

5. *The industry-by-commodity total requirements table (table 5).*--This table shows in each column the production (primary and secondary) required both directly and indirectly from the industry named at the beginning of each row per dollar of delivery to final demand of the commodity named at the head of the column. Continuing with the example on page 42 of the February 1979 article, to provide consumers with \$1.0 million of household furniture, \$980,200 (\$1.0 million x 0.98020) is required directly and indirectly from the household furniture industry (row 22) and \$206,810 (\$1.0 million x 0.20681) from the lumber and wood products industry (row 20), and so on for other industries. This table was derived from table 4 by the procedure explained in chapter IV. The importance of this table is that it provides industry impacts of deliveries to final demand. Thus, it is appropriate to use this table in relating industry output requirements to data which are gathered and usually published in industry terms, such as employment, employee compensation, investment expenditures, pollution abatement expenditures, corporate profits, and capital consumption allowances.

At the 496-order level, table 5 is a 489 by 485 rectangular matrix with the following omitted from the rows because: they had no output (I-O 78.0300), they were not industries (I-O 80.0000 Noncomparable imports and I-O 81.0000 Scrap, used, and secondhand goods), or they were special industries (I-O's 82.0000 - 85.0000). The same items plus the industries which had no commodities (I-O's 2.0701, 78.0200, 79.0100, and 79.0200) were omitted from the columns.

The results of earlier BEA I-O studies were presented in three basic tables: (1) transactions (or flow) table, (2) direct requirements table, and (3) total requirements table. Industry output was defined as production plus transfers-in of secondary products and transferred (comparable) imports. The Use table replaces the transactions table, but is not exactly the same because the Use table shows industry output excluding transfers. Secondary products, along with primary production by primary industry, appear in the Make table and comparable imports appear in column 95 of the Use table. Thus, the information in the Make and Use tables can be combined to produce a transactions table of the type included in earlier I-O studies. The commodity-by-industry direct requirements table is similar to the direct requirements table in earlier I-O studies, but does not include the direct requirements coefficients which resulted from the inclusion of transfers in the transactions table. The commodity-by-commodity total requirements table is new. The industry-by-commodity total requirements table is similar to the total requirements table in earlier I-O studies. However, there are certain differences resulting from the changed approach, following the SNA recommendations, in the 1972 I-O tables. These differences are discussed in chapter VI.

IV. Mathematical Derivation of the Total Requirements Tables for the 1972 Input-Output Study

This statement shows the matrix algebra underlying the derivation of the total requirements tables (tables 4 and 5). 36/

The following definitions are used:

U is a commodity-by-industry matrix in which the column shows for a given industry the amount of each commodity it uses, including noncomparable imports (I-O 80) and scrap, used, and secondhand goods (I-O 81). The latter is designated below as scrap. The intermediate portion of the Use table (table 1) contains the estimate of U for 1972. 37/

36/ The notation and derivation of the tables follow the System of National Accounts recommended by the United Nations. See: "A System of National Accounts," *Studies in Methods, Series F/No.2/Rev.3*, United Nations, New York, 1968; also, Stone, R., Bacharach, M. & Bates, J., "Input-Output Relationships, 1951-1966," *A Programme for Growth, Volume 3*, London, Chapman and Hall, 1963.

37/ These references to table 1 and 2 are to the 85-order Use and Make tables in the article, "Dollar Value Tables for the 1972 Input-Output Study," in the April 1979 *Survey*. However, the algebra of this chapter is applicable to all three levels of aggregation: 85-order, 365-order, and 496-order. However, an aggregation procedure, described later in this chapter, is required for the 85-order and 365-order versions of the total requirements tables.

V is an industry-by-commodity matrix in which the column shows for a given commodity the amount produced in each industry. V has columns showing only zero entries for noncomparable imports and for scrap. The estimate of V for 1972 is contained in columns 1 - 79 of the Make table (table 2). 38/

h is a column vector in which each entry shows the total amount of each industry's production of scrap. The estimate of h for 1972 is contained in column 81 of table 2. Scrap is treated in such a way as to prevent its requirement as an input from generating output in the industries in which it originates.

e is a column vector in which each entry shows the total sales to final demand of each commodity.

q is a column vector in which each entry shows the total amount of the output of each commodity.

g is a column vector in which each entry shows the total amount of each industry's output, including its production of scrap.

B is a commodity-by-industry matrix in which entries in each column show the amount of a commodity used by an industry per dollar of output of that industry. The intermediate portion of table 3 contains the estimate of B, derived from the 1972 Use table.

D is an industry-by-commodity matrix in which entries in each column show for a given commodity (excluding scrap) the proportion of the total output of that commodity produced in each industry. D is referred to as the market share matrix.

p is a column vector in which each entry shows the ratio of the value of scrap produced in each industry to the industry's total output.

Estimates for D and p are derived from the 1972 Make table.

A circumflex ($\wedge$) over the symbol for a vector indicates a square matrix in which the elements of the vector appear on the main diagonal and zeroes are entered elsewhere.

i denotes a unit (summation) vector containing only 1's. Its relation to the identity matrix (I) is shown by $\hat{i} = I$.

$$(1) q = Ui + e$$

$$(2) g = Vi = h$$

The following assumptions are made:

Inputs are required in proportion to output and the proportions are the same for an industry's primary and secondary products (the industry technology assumption); then

38/ Ibid., page 37.

$$(3) U = B\hat{g}$$

Each commodity (other than scrap) is produced by the various industries in fixed proportions (the market shares assumption); then

$$(4) V = D\hat{q}$$

Scrap output in each industry is proportional to total output of the industry; then

$$(5) h = \hat{p}g$$

The model expressed in equations (1) through (5) thus involves three constants (B, D, p) and six variables (U, V, h, e, q, g). The model solution is derived as follows:

Substituting (3) into (1) gives

$$(6) q = Bg + e$$

Substituting (4) into (2) gives

$$(7) g - h = Dq$$

Substituting (5) into (7) and solving for g:

$$g - \hat{p}g = Dq$$

$$(I - \hat{p})g = Dq$$

$$(8) g = (I - \hat{p})^{-1}Dq$$

Let $(I - \hat{p})^{-1}D = W$, then

$$(9) g = Wq$$

Substituting (9) into (6) and solving for q:

$$q = BWq + e$$

$$(I - BW)q = e$$

$$(10) q = (I - BW)^{-1}e$$

Substituting (10) into (9) gives

$$(11) g = W(I - BW)^{-1}e$$

$(I - BW)^{-1}$ is the commodity-by-commodity total requirements matrix (table 4), giving commodity output required per dollar of each commodity delivered to final demand.

$W(I - BW)^{-1}$ is the industry-by-commodity total requirements matrix (table 5), giving the industry output required per dollar of each commodity delivered to final demand.

Aggregation

The 1972 I-O tables were prepared at the 496-order level of classification. The tables published in the April 1979 *Survey* article appear at the 85-order level. In order to take into account the full 496-order detail in making the mathematical redefinitions described above, W and BW have been developed at the 496-order level and then aggregated before calculation of the 85-order total requirements tables (tables 4 and 5). A similar aggregation procedure is required for preparation of the 365-order total requirements tables.

Interpretation of the mechanical redefinition

As mentioned elsewhere in the text (see especially page 49), all secondary products are redefined. Those which are not redefined specifically have been redefined mechanically using the mathematics presented in this chapter. The mechanical redefinition is analogous to specific redefinitions. The following section extends the mathematical derivation, after first simplifying to exclude the scrap adjustment, and then provides a numerical example of the calculations consistent with the mechanical redefinition.

Consider the matrix product BW, which appears in (10), and let it be represented by A. Then,

$$(12) A = BW$$

and, from the definition of W,

$$(13) A = B(I - \hat{p})^{-1}D$$

Now, let us simplify the derivation by setting $p = 0$. This has only minor effects on the results of the calculation, since p is usually very small or zero. Then,

$$(14) A = BD; \text{ or } A = BIDI$$

Now replace the I's by equivalent expressions, to give:

$$(15) A = B(\hat{g}\hat{g}^{-1})D(\hat{q}\hat{q}^{-1}).$$

By virtue of the associativity of matrix multiplication,

$$(16) A = (B\hat{g})\hat{g}^{-1} (D\hat{q})\hat{q}^{-1}.$$

Substituting (3) and (4) into (16),

$$(17) A = U\hat{g}^{-1}V\hat{q}^{-1}.$$

Postmultiplying both sides by $\hat{q}$,

$$(18) A\hat{q} = U\hat{g}^{-1}V.$$

A theorem of matrix algebra holds that $YZ = (Z'Y')'$. Also, the inverse of a diagonal matrix is diagonal, and a diagonal matrix is its own transpose. Therefore,

$$A\hat{q} = U(V'\hat{g}^{-1})', \text{ or}$$

$$(19) T = UC'$$

where $T = A\hat{q}$ and $C = V'\hat{g}^{-1}$. A single element t_{jk} represents the amount of commodity j used in producing commodity k . Since C is square, this can be rewritten as

$$T = U(I + C' - I)$$

$$(20) T = U + U(C' - I).$$

Here, the first term is the original commodity-by-industry use matrix and the second term incorporates the "mechanical redefinitions" required to shift inputs and create the commodity-by-commodity use matrix (or, in other words, to make the industry classification scheme conform precisely to the commodity classification scheme).

To illustrate, consider the numerical example employed above, in the discussion of I-0 as an accounting system (chapter II-C, page 12). In this example:

$$U^{*39/} = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 4 & 2 \\ 0 & 0 & 2 \\ 3 & 1 & 4 \\ 2 & 1 & 1 \end{bmatrix} \quad V = \begin{bmatrix} 5 & 3 & 0 \\ 0 & 8 & 0 \\ 5 & 0 & 5 \end{bmatrix} \quad g = \begin{pmatrix} 8 \\ 8 \\ 10 \end{pmatrix} \quad q = \begin{pmatrix} 10 \\ 11 \\ 5 \end{pmatrix}$$

(1) (2)

Notes (1) and (2) indicate that the items in the columns are reversed and thus identify the required redefinitions in the context of the Make matrix. Proceeding with the calculations,

$$C = \begin{bmatrix} .625 & 0 & .5 \\ .375 & 1 & .0 \\ .000 & 0 & .5 \end{bmatrix}$$

$$C' - I = \begin{bmatrix} -.375 & .375 & .0 \\ .000 & .000 & .0 \\ .500 & .000 & -.5 \end{bmatrix}$$

$$= \begin{bmatrix} -.375 & .375 & 0 \\ .000 & .000 & 0 \\ .000 & .000 & 0 \end{bmatrix} + \begin{bmatrix} .0 & 0 & .0 \\ .0 & 0 & .0 \\ .5 & 0 & -.5 \end{bmatrix}$$

(1) (2)

^{39/} Here, the value added rows will be considered part of the commodity-by-industry Use matrix, which will therefore be denoted by U^* rather than by U . Similarly, T^* will denote the commodity-by-commodity Use matrix augmented to include value added.

The two numbered terms correspond to the two required redefinitions.

$$\begin{aligned}
 U^*(C' - I) &= \begin{bmatrix} 2 & 2 & 1 \\ 1 & 4 & 2 \\ 0 & 0 & 2 \\ 3 & 1 & 4 \\ 2 & 1 & 1 \end{bmatrix} \left(\begin{bmatrix} -.375 & .375 & 0 \\ .000 & .000 & 0 \\ .000 & .000 & 0 \end{bmatrix} + \begin{bmatrix} .0 & 0 & .0 \\ .0 & 0 & .0 \\ .5 & 0 & -.5 \end{bmatrix} \right) \\
 &= \begin{bmatrix} -0.750 & 0.750 & 0 \\ -0.375 & 0.375 & 0 \\ 0.000 & 0.000 & 0 \\ -1.125 & 1.125 & 0 \\ -0.750 & 0.750 & 0 \end{bmatrix} + \begin{bmatrix} 0.5 & 0 & -0.5 \\ 1.0 & 0 & -1.0 \\ 1.0 & 0 & -1.0 \\ 2.0 & 0 & -2.0 \\ 0.5 & 0 & -0.5 \end{bmatrix} \\
 &\qquad\qquad\qquad (1) \qquad\qquad\qquad (2)
 \end{aligned}$$

The two numbered terms are the two required redefinitions.

$$\begin{aligned}
 T &= U^* + U^*(C' - I) \\
 &= \begin{bmatrix} 2 & 2 & 1 \\ 1 & 4 & 2 \\ 0 & 0 & 2 \\ 3 & 1 & 4 \\ 2 & 1 & 1 \end{bmatrix} + \begin{bmatrix} -0.750 & 0.750 & 0 \\ -0.375 & 0.375 & 0 \\ 0.000 & 0.000 & 0 \\ -1.125 & 1.125 & 0 \\ -0.750 & 0.750 & 0 \end{bmatrix} + \begin{bmatrix} 0.5 & 0 & -0.5 \\ 1.0 & 0 & -1.0 \\ 1.0 & 0 & -1.0 \\ 2.0 & 0 & -2.0 \\ 0.5 & 0 & -0.5 \end{bmatrix} \\
 &= \begin{bmatrix} 1.750 & 2.750 & 0.5 \\ 1.625 & 4.375 & 1.0 \\ 1.000 & 0.000 & 1.0 \\ 3.875 & 2.125 & 2.0 \\ 1.750 & 1.750 & 0.5 \end{bmatrix}
 \end{aligned}$$

Note that the redefinition process does not affect the Use matrix row sums:

$$T^*i = U^*i = \begin{pmatrix} 5 \\ 7 \\ 2 \\ 8 \\ 4 \end{pmatrix}$$

In contrast, the redefinition process does affect the column sums (which here include value added):

$$\begin{aligned}
 U^*i &= \begin{pmatrix} 8 \\ 8 \\ 10 \end{pmatrix} = g \text{ (before redefinition)} \\
 T^*i &= \begin{pmatrix} 10 \\ 11 \\ 5 \end{pmatrix} = q \text{ (after redefinition)}
 \end{aligned}$$

V. Other Conventions and Definitions of Terms

Classification of industries and commodities

For the articles in the February and April 1979 issues of the *Survey*, production is grouped into 85 industries. The industry categories, their I-O numbers, and their SIC composition are given in appendix B of the first article and appendix I of the second article. Seventy-seven of the 85 are combinations of industries as defined in the *SIC Manual*, 1972 edition. Two are government enterprises, which are only partially identified in the SIC. Six are special industries (or commodities) established for convenience in presenting the I-O tables. They are noncomparable imports (I-O 80), designated as "directly allocated imports" in earlier tables; scrap, used, and secondhand goods (I-O 81) which is only a commodity; government (I-O 82); rest of the world (I-O 83); households (I-O 84); and inventory valuation adjustment (I-O 85). Earlier I-O tables included two additional dummy industries, the business travel, entertainment, and gifts industry and the office supplies industry. The commodities previously included in the two dummy industries are distributed to consuming industries and final demand in the 1972 table.

The 1972 I-O tables were prepared at the 496-order level, but they have also been aggregated to the 365-order level. This level of classification is that which is most comparable to the 367-order of tables produced for 1963 and 1967. However, because of the changes in the 1972 SIC and the different approach used for the 1972 I-O study, much of the comparability with the earlier tables is lost. At the 365-order level, the same considerations apply as those for the 496-order level table with respect to industries and commodities. About the only difference is that I-O 2.0701 is combined with I-O 2.0702 at the 365-order level, producing I-O 2.07, which exists as both an industry and a commodity, whereas I-O 2.0701 had no commodity. The reader will note that the 365-order classification is the first four digits of the six-digit classification for the 496-order tables.

Wholesale and retail trade

The I-O tables do not trace actual flows of commodities for resale to and from trade. If trade were shown as buying and reselling commodities, industrial and final users would make most of their purchases from either (or both) wholesale and retail trade. To show the links between the production of commodities and purchases of them by industrial and final users, commodities are shown as moving directly to the users, bypassing trade. However, gross margins of trade (i.e., operating expense plus profit) are added to each transaction to provide the trade component of the difference between producers' values and purchasers' values. (The remaining portion of the difference is transportation costs needed to deliver the commodity to the user plus insurance on transportation of imports.) The output of the trade industry is the sum of all its margin charges and its direct allocations of trade services to users. It should be noted that the inputs from trade to any purchasing industry or final user are the sum of all trade margins on commodities purchased plus direct allocations, if any.

Valuation of transactions

This section provides a broader discussion of valuation than that shown in II-E.

The dollar values of the transactions in an I-O table can be shown either in the prices received by the producer or the prices paid by the purchaser. The valuation underlying the 1972 I-O tables is based on producers' prices. ^{40/} Such prices exclude transportation and trade distribution costs, which make up the difference between producers' and purchasers' prices. Under a system of producers' prices valuation, the individual inputs into a consuming industry or final demand user are valued at producers' prices, while the distribution costs associated with these inputs appear as separate aggregate inputs from the appropriate transportation and trade commodity (i.e., I-O's 65.0100 - 65.0600, 69.0100, and 69.0200).

Thus, inputs from transportation and trade are treated as fixed proportions of the total purchases by an industry. This is consistent with the assumption of stable input relationships underlying most uses of the I-O system.

Comparable and noncomparable imports

This section gives a more unified and complete discussion of imports than that shown in II-D and II-E and footnote 21 on page 11 and should be helpful to the reader in distinguishing between the two types. Imports are divided into two major categories: "comparable imports" and "noncomparable imports." An import is classified as comparable if it is produced commercially by a domestic industry. The domestic port (landed) value of the import is added to domestic output of the item for distribution to the various intermediate and final consumers. The domestic port value of each comparable import is shown as a negative entry in the import column of final demand (table 1, column 95), so that the row total for each commodity equals the domestic production of that commodity.

An import is noncomparable if: (1) there is no significant domestic production; or (2) the item is purchased and used outside the U.S., including personal travel abroad, port expenditures abroad, expenditures of U.S. residents working abroad, film company distribution and other expenditures abroad; or (3) the item is part of a group of commodities which are unique in expenditures and do not fit neatly into the output of any other commodity. Included in the first group, along with coffee beans, spices, bananas, etc., are Government purchases abroad and Government sales of certain imported stockpile materials. Included in the second group are consular fees and communication costs, and all fees and royalties paid to foreigners. Included in the third group are used goods and such items as architectural and engineering drawings and plans, developed X-ray and other films, exposed newsreel film, antiques, art works, invention models, and fossils.

Noncomparable imports are lumped together at foreign port value in row 80.0000 and distributed to the various consuming industries and final users. The total value of all such imports is shown as a negative entry in the import column of final demand (table 1, row 80 at column 95).

The determination of whether a commodity should be treated as comparable or noncomparable was based on information in *Summaries of Trade and Tariff Information*, U.S. Tariff Commission (now International Trade Commission).

^{40/} Producers' prices are defined to include Federal and State and local excise taxes collected and paid by the producer.

Government enterprises

The current account activities of both Federal and State and local enterprises are included in the intermediate portion of the I-0 tables. As defined in the National Income Supplement, ^{41/} "Government enterprises are those agencies of government whose operating costs are at least to a substantial extent covered by the sale of goods and services, in contrast to the general activities of government which are financed mainly by tax revenues and debt creation." The definition has since been modified to require that at least 50 percent of costs be covered by sales of goods and services, sales must be \$10.0 million or more, and most of the capital stock must be held by a government corporation or agency (if there is any capital stock). For Federal enterprises, the I-0 tables include the Postal Service (formerly the Post Office), Federal electric utilities, the Commodity Credit Corporation (which has inputs but only zero output), and all others combined. State and local government enterprises include government passenger transit, State and local electric utilities, and all other.

In cases where the output of these enterprises is identical with private industry production, this output is classified in the scheme according to the same criteria used for private output. There are exceptions in the cases where the public commodity accounts for the largest portion of commodity output. The enterprises for which the privately-produced commodity is used for distribution of all the commodity are I-0's 78.0200, 79.0100, and 79.0200. Similarly, parts of 78.0400 and 79.0300 are distributed through the private sector.

Inventories

Table 1, column 93.0000, shows for each commodity (listed at the beginning of the rows) inventory change, which is a component of final demand. The table also shows for each commodity consumption of the commodity by industrial users and by the other components of final demand. Thus, the total for each row, that is, consumption plus inventory change, is the total domestic production of each commodity after allowing for comparable imports. The accounting for inventory change in I-0 differs from that in the NIPA's. The latter shows the changes in inventories held by each industry; for each industry, the inventories consist of the several commodities it holds. The I-0 values show the change in inventories of a specific commodity wherever held.

Thus, the inventory change shown for each I-0 commodity represents the change in the inventory position of the commodity regardless of which industry actually owns or holds the inventories. Inventories are so classified in the I-0 table in order to provide the balance between the output of each commodity and its total consumption. ^{42/} Current production includes commodities which may end up in inventories and are therefore not reflected in consumption. On the other hand, consumption may come from the inventories of the producer, of the consumer, or of trade companies as well as

^{41/} *National Income, 1954 Edition, A Supplement to the Survey.*

^{42/} Because input patterns are more likely to remain stable over time if they are related to actual production requirements rather than to purchases, which are affected by fluctuations in inventory holdings, the various material inputs into an industry measure consumption rather than purchases.

from current output. ^{43/} To the extent it comes from inventories, it is not included in current production. Therefore, adding inventory increases of commodities and subtracting inventory depletions achieve the balance with gross output of the commodity.

Current and capital account transactions

Current account transactions are those which are expensed within one year of purchase. Capital account transactions are those involving goods or structures which have an average useful life in excess of one year and are usually capitalized by industry. In the standard I-0 table, only current account transactions are recorded within the intermediate portion of the table. Capital goods (producers' durable equipment and structures) which are produced in a given year and sold to business users are all assigned to a final demand sector, identified as gross private domestic fixed investment. Capital goods may also be exported, placed in inventories, or sold to government. Capital goods include new private structures (the product of new construction industries, production of mobile homes, and dealers' commissions) and producers' durable equipment (new and replacement purchases of both new and used equipment, used by the private sector in the production of goods and services). The standard I-0 table makes no attempt to identify the industries which buy the capital goods. These transactions are recorded in a capital goods flow table, which is consistent in its industry classification and its row totals with the standard I-0 table but is prepared substantially independently of the standard I-0 table.

It would not be advisable to include capital goods purchases in the input structure for an industry, because the relationship between capital goods purchases in a given year and that year's industry output is not likely to remain stable.

BEA has produced capital flow tables for 1963 and 1967 and is currently engaged in producing a similar one for 1972 which will show the distributions of structures and equipment cross-classified by producing commodity and purchasing industry. Like the earlier tables, the 1972 capital goods flow table will be an expansion of the gross private domestic fixed investment column for 1972 in the standard I-0 table into purchasing industries. The capital goods flow table supplementary material will also show separately the distribution of the major equipment items which fall into a commodity category.

Force account construction

The output of the construction industries, whether new or maintenance and repair, includes both construction work performed on a contract basis for an industry or for a final demand sector and work achieved through the utilization of the work force of the industry or the final demand sector (e.g., government). The construction work performed by the work force of the consuming industry or final demand sector is called force account construction. The estimate of the value of force account construction for each industry which performs such is summed by construction type (including maintenance and repair as well as new) and added to the output of the appropriate construction industry. The input side of the force account construction activity is made up of employee compensation and the various materials and services necessary to perform the work. The employee component is available to a large extent

^{43/} In some cases, inputs may come from purchases from government stock (e.g., withdrawals from Commodity Credit Corporation inventories). Such withdrawals are not handled as inventory depletions but are treated as general government sales (negative purchases).

from the Census of Population and the compensation is estimated. Material consumption is available in a few instances from the cost of materials table (7A) in the Census of Manufactures but in general it is estimated for the construction activity as a whole (including the added force account estimate).

The addition of force account construction to each type of contract construction makes total construction for each type become an activity, as well as an industry. Construction has no secondary products and the inclusion of force account construction means that no other industry has any secondary output of construction. Thus, the commodity and the industry are identical and each type is then an activity.

Though construction is the only group of industries for which force account activity is recognized statistically in the I-O system, there are other areas in which force account work exists. For purposes of I-O analysis, including the goal of creating more homogeneity for industries and commodities, it would be desirable to include some of these force account activities in the system. For example, there is substantial force account transportation activity in various industries, such as delivery or malt beverages, carbonated beverages, and dairy products, where the work can be self-performed as well as purchased. Transportation is presently defined to include only common or contract carriers and not self-performed work. The main reason for not adopting the force account concept for transportation and some others is the scarcity of data for estimating the amount and industrial composition of the force account portion of the activity.

There are a few additional activities in the I-O system for which commodity output is identical with industry output, namely I-O's 71.0100, 72.0300, 77.0200, 77.0400, 77.0500, 77.0600, 77.0700, 77.0800, 77.0900, and 78.01000. These are identified in the Make table. They, along with construction, are the only activities for which such identity exists in the 1972 I-O transactions table; however, the transformations which lead to the unpublished "synthetic" transactions table (available on computer tape) places all industries on an activity basis (i.e., the table shows the commodities that are consumed in producing commodities). This "synthetic" table is prepared before the commodity-by-commodity total requirements table (table 4) can be calculated.

Owner-occupied dwellings

In order to eliminate a source of instability in the measurement of GNP, home ownership is treated as a business in both the NIP and I-O accounts. An imputation of the rental value of owner-occupied homes is made so that comparable treatment exists for both rented and owner-occupied housing. The imputed output of this industry (I-O 71.0100) is sold to the homeowner (PCE) in his capacity as tenant. The expenses of the industry include repair and maintenance construction, various closing costs (only in the year of purchase), and other expenditures relating to the upkeep of the space.

VI.--Differences Between the 1972 and Earlier I-O Studies

As mentioned in the introduction, a number of changes have been made in the 1972 I-O study. The most important change has to do with the treatment of secondary products. The approach used in 1972 represents two types of redefinitions to achieve an activity table. The first type is called "specific" redefinitions and those used in 1972

represent three sets of specific redefinitions which are used along with redefinitions used in earlier studies. The second type is called "mathematical" or "mechanical" redefinitions and is an entirely new approach in the 1972 I-O system. The following leads into the discussion of redefinitions by first reviewing the concepts of establishments and secondary products and then explaining the assumptions behind the redefinitions. After that there is a listing of other changes made in the 1972 I-O tables and some of the reasons for making the changes.

Establishment

An establishment is an economic unit generally at a single physical location where business is conducted or where services or industrial operations are performed. (Examples would include a factory, hotel, mine, farm, or sales office.)

Where distinct and separate economic activities are performed at a single physical location, each distinct activity should be treated as a separate establishment. For activities such as construction, transportation, communications, production of electricity, distribution of gas, provision of sanitary services, and similar physically dispersed operations, establishments are represented by those permanent main or branch offices, stations, etc., which are either directly responsible for supervising such activities, or are the base from which personnel operate to carry out these activities. Hence, the individual site, projects, fields, lines, or systems of such dispersed activities are not considered to be establishments.

A grouping of establishments performing the same major activity constitutes an industry and is so defined in the SIC. An establishment is not generally identical to an enterprise or company. Enterprises and companies often consist of several establishments, which may be classified in several industries.

Secondary products

The I-O industry classification is based on the SIC for almost all industries. An establishment is classified in an industry based on its principal activity. However, once an establishment is classified in an industry, its entire output, subsidiary as well as principal, is counted as part of the output of the industry. Its principal output, that which determines its industry classification, is called primary output; its subsidiary output is called secondary.

Secondary products present a special problem in that they can represent an element of heterogeneity in the output of an industry. If different inputs (materials, services, etc.) are required for the secondary output as compared with the primary output, a change over time in the relative importance of the two will cause a change over time in the overall input patterns for the industry. 44/

A further problem resulting from secondary production is that a given product is produced by more than one industry. As a consequence, an industry which is a consumer of such a product may obtain it either from the industry which produces it as primary

44/ This, of course, is also true when an industry consists of various primary products which have different input patterns. This general "product mix" problem is an important consideration in deciding upon the classification structures. However, primary products are usually more closely related to each other than are primary to secondary products.

output, or from any of the industries in which it is produced as a secondary product. In many cases, it would not be feasible to determine which industry was the actual producer of the good purchased. The available data on consumption of materials generally indicate only the total usage by an industry of a given good. Even if the data permitted, it would not be meaningful or desirable for purposes of I-O analysis to differentiate the industrial sources of an industry's purchases. Such base year relationships would be subject to substantial shifts over time.

The most straightforward solution to the problem of the secondary production would be the removal of secondary products from the industry outputs. The receipts of an industry from secondary products would be subtracted from the industry's output total and added to the output total of the industry which produces it as a primary product. Similarly, the various goods, services, and value added components used to produce the secondary product would be subtracted from the inputs of the industry which produced the secondary product and would be added to the inputs of the industry to which it was primary. Such a technique is referred to as "redefinition."^{45/} In concept, it is the most attractive of the available solutions to the problem, since the output of each industry would consist only of primary products and only the primary industry would be the source of these products. Moreover, inputs would reflect requirements for production of primary output only. The 1972 table adopts this approach.

Redefinitions

The treatment of secondary products in the 1972 I-O table differs substantially from the transfer approach used in earlier I-O studies. In the earlier studies, selected secondary (and some primary) products were redefined to other industries which were the primary producers of the products. Thus, the product and the associated inputs were excluded from the producing industry and included in the primary industry. The secondary product that was redefined differed considerably in input structure from the producing industry's primary product and was often a significant proportion of the production of the industry that produced it or of the industry to which it was redefined. The ratio of inputs to output for the redefined product was assumed to be the same as for the industry to which it was redefined. For purposes of this report, such adjustments are called specific redefinitions. In the earlier studies, all other secondary product was transferred, that is, treated as if it was sold by the industry (or industries) producing it to the industry for which the secondary product was primary and added to the output of that industry for distribution to the users of that commodity.

In the 1972 study, all secondary product is redefined. To the original specific redefinitions prior to 1972, three groups of new redefinitions were added. All other secondary product was redefined mechanically, using the mathematical procedures shown in chapter IV.

The specific redefinitions cover a wide range of industries and commodities and are especially important in services, trade, transportation, real estate, and electric utilities. Those newly introduced for the 1972 table are: electric energy produced and sold by manufacturing, mining, and railroads was redefined to the electric utility industry (I-O 68.0100); manufacturers' wholesale sales of purchased goods (resales) were redefined to the wholesale trade industry (I-O 69.0100); and rental activities of all industries were redefined to the real estate industry (I-O 71.0200).

^{45/} A table incorporating such redefinitions for all industries is often referred to as an "activity" table.

Among the important specific redefinitions retained from earlier tables were: manufacturing in trade and service industries was redefined to the appropriate manufacturing industry; manufacturers' sales offices were redefined from wholesale trade to the appropriate manufacturing industry; retail trade in service industries was defined to the retail trade industry (I-O 69.0200); services produced in the trade industries were redefined to the appropriate service industries; selected services were redefined within the service industries; alumina production was redefined from industrial inorganic and organic chemicals (I-O 27.0100) to primary aluminum (I-O 38.0400); and receipts for apparel sales from establishments primarily engaged in dressing and dyeing of furs were redefined from manufacturing industries, n.e.c. (I-O 64.1200) to apparel made from purchased materials (I-O 18.0400).

The specific redefinition approach is confined to situations where the input structure for the redefined commodity is significantly different from the producing industry's input structure. This accords with the constant commodity technology assumption discussed in the United Nations "System of National Accounts" (SNA). The mechanical redefinition used for all other secondary products in the 1972 I-O study adopts the SNA assumption of constant industry technology, namely that the ratio of inputs to output is the same for a redefined product as for the industry in which the secondary product is produced.

In the 1972 I-O study, the specific redefinitions of secondary products are reflected in tables 1, 2, and 3, since the industries were redefined before the tables were developed. They are reflected in tables 4 and 5 just like inputs which were not specifically redefined. The mechanical redefinitions are reflected only in tables 4 and 5, but they result from the relationships in tables 2 and 3, as explained in chapter IV.

BEA recognizes that the assumption of constant industry technology for the mechanical redefinition of secondary products is not the best choice in some instances. This procedure was adopted for the 1972 study because it was the most promising in terms of the time available prior to the expected publication date. BEA expects to reconsider for the 1977 tables the areas for which the commodity technology assumption might be more appropriate.

In order to mitigate the impact of the use of the constant industry technology assumption in calculating the total requirements tables, BEA used the specific redefinition approach for three major categories of transactions in the 1972 I-O tables that had previously been treated by transfer of secondary products to the primary industry.

As stated above, the specific redefinitions are included in all the tables, while the mechanical redefinitions are reflected only in the total requirements tables (4 and 5). However, the implicit values of the commodity-by-commodity transactions reflecting these redefinitions can be calculated from the materials available on BEA's computer tapes to produce a "synthetic" commodity-by-commodity transactions table similar in nature to the published table. It differs, however, in that it is a pure "activity" table showing dollar values of the inputs of commodities needed to produce commodities. There are no published versions of this "synthetic" table.

The use of the mechanical redefinition for all secondary products other than those which have been specifically redefined is a substantial improvement over the transfer treatment used in earlier I-O studies. The previous treatment had several defects, the most important of which are the following. First, the composition of each industry's inputs was distorted by the inclusion among inputs of fictitious purchases of its primary product from other industries. Correspondingly, the distribution of each industry's output to its customers was distorted by the inclusion among outputs of fictitious sales of its secondary product. Second, the fictitious sales between industries tended to distort interindustry relationships. For example, printing is a secondary product of the metal containers industry. This printing was sold fictitiously to the printing and publishing industry. That industry produced advertising as a secondary product, which was sold fictitiously to the advertising component of the business services industry. In this way, the metal containers industry was linked to the printing and publishing industry, which in turn was linked to the business services industry. Consequently, an increase in the demand for advertising led indirectly to an increase in the demand for metal containers.

The treatment of secondary products in the 1972 I-O study by mathematical redefinition helps to minimize the defect just described. However, blanket use of the industry technology assumption (other than for specific redefinitions) needs further review. In particular, it is advisable that industries and commodities should be examined to identify those secondary products for which the commodity technology assumption is more appropriate.

Other differences in the 1972 I-O system

1. The classification system

Though not a major change in concept, the fact that the I-O classification system depends largely on the current SIC makes for important changes in the definition of industries and commodities and the resultant output totals and inputs to industries. The major problem here is that the changes in the SIC have been numerous and some have involved large values, making it almost impossible to achieve comparability between the 1972 and the 1967 tables. Some industries have been eliminated, some new ones have been established, others have moved commodities from one SIC to another. By carefully examining the list of changes in the *SIC Manual 1972*, and also looking at the changes in the *1972 Census of Manufactures*, one could find ways of combining industries to achieve output comparability, but it would be a major task to revise the I-O coefficients to reflect these changes.

2. Eating and drinking places

In earlier I-O tables, eating and drinking places were included in retail trade and thus only the margin over cost of materials was included in output. For the 1972 table, eating and drinking places have been taken out of retail trade and established as a separate industry. Thus, the value of the corresponding commodity is measured on a gross basis, including the cost of purchased food and beverages. It was judged that the eating and drinking places industry, which actually changes the nature of the product which it buys, performs a function similar to other industries rather than just a margin function. As a result of the elimination of eating and drinking places, the retail trade industry has a more homogeneous input structure than before.

3. *Elimination of two "dummy" industries*

In earlier I-O tables, there were two "dummy" industries: Office supplies; and business travel, entertainment, and gifts. These were eliminated in the 1972 table and the goods and services which were formerly routed through these accounts are now assigned directly to the various users. The main reason for the change is that the allocation procedure can now send the components of the dummy industries individually to users rather than send them as packages with fixed proportions of the components. The capability of present-day computer systems has now made this approach feasible, whereas before it would have been a difficult chore.

4. *Imports*

As explained earlier, imports are divided into two categories: "comparable imports" and "noncomparable imports." The treatment of comparable imports differs from that in earlier I-O tables. Imports for industrial use were formerly shown as if purchased by the industry producing the comparable commodity and added to that industry's output for distribution to using industries; imports purchased by final users were shown as purchased directly from the row of directly allocated imports. The aggregate of comparable imports used by industries and the aggregate of all other imports (i.e., comparable imports used by final users and all noncomparable imports) were shown in the earlier studies as negative entries in the net export column at the two import rows. The treatment of noncomparable imports is the same in the 1972 and earlier I-O studies, though they are more narrowly defined in 1972. The difference in definition has to do with the fact that in earlier studies, imports sold directly to final demand were labeled "directly allocated," or noncomparable. The exceptions are shown in detail in the earlier discussion of imports.

VII. Preparation of Bills of Goods

Before the total requirements tables (tables 4 and 5) can be used to measure the impact on each commodity (or industry) of projected changes in the level of GNP or any of its components, a bill of goods must be formulated and certain other steps taken. A bill of goods is a listing by commodity composition of one or more final demand components (PCE, PDE, government purchases of goods and services, etc.); the detail must be classified by the commodity categories of the I-O table, taking into account the definitions and conventions adopted for the 1972 study. In order to use the 1972 I-O tables, the bills of goods item detail must be expressed in 1972 prices and valued at producers' prices. The wholesale and retail trade margins associated with each item of the bill of goods are aggregated and specified as single requirements from wholesale trade and from retail trade; similarly, the transportation costs involved in the delivery of the commodities in the bill of goods to final markets (including inventory change) are aggregated and specified as single requirements from each of the transportation margin categories (railroad, trucking, air, water, and oil pipeline).

Some of the supplementary data useful in preparing bills of goods are presented in the February and April 1979 *Survey* articles. These data are contained in Table A.-- Input-Output Commodity Composition of Final Demand, in Producers' and Purchasers'

Prices, 1972; Table B.--Input-Output Commodity Composition of Personal Consumption Expenditures in Producers' and Purchasers' Prices, 1972; Table C.--Input-Output Commodity Composition of Producers' Durable Equipment Expenditures in Producers' and Purchasers' Prices, 1972; and Table D.--Comparable Imports in Foreign Port Value and Domestic Port Value, 1972. The same tables at the 496-level are available from IED upon request. In addition, the estimates in table 1 (at each level of aggregation) for 1972 can be helpful in formulating a bill of goods for some other period.

If the final demand to be analyzed is available in the aggregate only, the estimates in table 1 (in the upper right quadrant) that show the commodity composition of each category of final demand for 1972 may be used to develop a detailed bill of goods. This is done by using the 1972 proportions for each category to distribute GNP for the projected period into the same categories. Then the proportionate commodity composition (calculated from table 1) for each category for 1972 is applied to the category totals (in 1972 dollars) for the projected period.

Table A shows the I-O commodity sales to each category of final demand, in producers' and purchasers' prices, and the trade margins and transportation costs included in purchasers' prices. Data are shown only for those commodities for which purchasers' prices differ from producers' prices (i.e., products). Services have no trade margins or transportation costs, so producers' prices are the same as purchasers' prices and can be taken directly from table 1. Table A may be used if the final demand to be analyzed is given in purchasers' prices and in the classification of the I-O table. One can use the 1972 proportions of purchasers' prices comprising trade and transportation costs to estimate producers' prices.

Table B shows the I-O commodity composition of 1972 expenditures for each of the 86 components into which PCE is classified in the NIPA's (table 2.6 in the annual NIPA's, as published in July 1979). For each PCE component, the table shows the breakdown of expenditures by I-O commodity in producers' prices, and the transportation costs and trade margins that are added to arrive at the PCE component value, which is in purchasers' prices. If one stipulates the NIPA PCE categories in the analysis, the estimates in table B can provide the producers' values for each I-O commodity contributing to that category by using the proportions of total purchasers' value (including trade and transportation) represented by the commodities in the 1972 study. If one wishes to change the proportions based on more recent information, that is readily accomplished.

Table C shows the I-O commodity composition of 1972 expenditures for each of the 24 types into which PDE is classified in the NIPA's (table 5.6). ^{46/} For each PDE type, the table shows the breakdown of expenditures by I-O commodity in producers' prices, and the transportation costs and trade margins that are added to arrive at the PDE component value, which is in purchasers' prices. As discussed for PCE above, the 1972 relationships can be used for analysis or they can be revised based on more recent information.

^{46/} The estimates included in each NIPA type represent purchases of new equipment, net purchases of used equipment from other final users (e.g., persons and government), and for the passenger car category, a deduction for sale of scrapped cars. The sale of equipment scrap, except passenger cars, is not identified by type; it is deducted in total to yield total private purchases.

Table D may be used to determine domestic port values of comparable imports for which the estimates have been secured in foreign port values. The 1972 proportions of transportation costs, duty, and insurance on transportation to foreign port value can be used for this purpose if current estimates for these items are not available. As noted in the April 1979 *Survey* article, the dollar values of transportation and insurance in table D differ from those in column 95 of table 1. This results from the fact that the column total for transportation in table D consists of the cost of transportation of imported goods by foreign and domestic carriers, whereas the row entry for transportation in table D consists of the transportation costs for use of foreign carriers plus costs for transporting U.S. residents and their personal goods on foreign carriers. The entry for transportation in column 95 of table 1 represents the column total for table D less the row entry for transportation in table D. Similarly, the insurance value in table 1 equals the column total for insurance in table D less the row value for insurance in table D. The entry for trade in column 95 of table 1 is positive and equal to the total for duty in table D. Total imports, in column 95 of table 1, are equal to the negative of total foreign port value, in the first column of table D, plus total noncomparable imports in row 80, column 95 of table 1.

VIII. Redefinitions, Reclassifications Adjustments for Coverage, etc.

This chapter shows the adjustments made to the data entering into the 1972 I-0 estimates in order to arrive at the industry and commodity output totals published in summary form in the February and April 1979 *Survey* articles and in *Volume I: The Use and Make of Commodities by Industries, 1972*. The I-0 classification system is published in both Volumes I and II. The first list (A) shows both specific redefinitions and coverage adjustments to the published Census and other data as initially defined by the SIC. The first column of list A shows the industry from or for which there was a redefinition. A minus (-) sign in the "amount" column indicates a reduction in the output of the "affected industry." A plus (no sign) in the "amount" column indicates an increase in the output of the "affected industry." When there is no entry in the first column, it means that there was a coverage adjustment in the output of the "affected industry." Note that redefinitions affecting trade (I-0 69.0100 and 69.0200) refer to total receipts and not margins. Margins (output) for the trade industries were estimated on the basis of total receipts, including redefinition amounts.

List (A) shows all specific redefinitions for 1972 other than those covered in three categories: (1) rental receipts of all industries; (2) electric energy produced and sold by manufacturing, mining, and railroad industries; and (3) sales by wholesale of goods purchased for resale without further processing by manufacturing and mining industries. The items in these categories are not listed because there are nearly a thousand of them and very few amount to more than trivial proportions of the industries from which they were redefined. For the industries to which these three categories were redefined, they sum to the following amounts.

<u>Code</u>	<u>Millions of dollars</u>
I-0 71.0200 Real estate -----	16,047.0
I-0 69.0100 Wholesale trade -----	5,737.2
I-0 68.0100 Electric services (utilities)-	83.1

The second list (B) shows commodity reclassifications in the 1972 I-0 table which are treated as secondary products but would be considered primary products if the SIC were followed strictly. These items appear in the Make table (table 2 of Volume I).

The third list (C) shows the imputed amount of force account construction included in new and maintenance construction. The imputation was made by means of estimating the force account construction in each industry.

Additional information concerning redefinitions, reclassifications, coverage adjustments, and additions for taxes will be found in appendix A.

Appendix B provides a discussion of the major sources and estimating methods for the 1972 I-0 use table.

Appendix C provides a classification list of I-0 industries at the 85-order and 496-order levels, including the relation of I-0 codes to the SIC.

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)

From or to (-) <u>1/</u>	Affected industry	Amount
I-0 4.0000 Agriculture, forestry, and fishery services		
14.0101	Receipts for custom slaughtering -----	-13.0
65.0300	Receipts from others for the transportation of farm workers for the benefit of the others -----	-2.8
69.0100	Receipts from the resale of agriculture supplies, e.g., fertilizers, feeds -----	-9.5
69.0200	Receipts from resale of animals, nursery products, etc. --	-22.5
73.0300	Receipts for accounting services performed for others ----	-0.9
11.0000	Receipts for landscaping -----	200.0
69.0100	Crop and livestock services performed in wholesale trade establishments -----	<u>256.6</u>
	Net (increase) -----	407.9
I-0 8.0000 Crude petroleum and natural gas		
11.0000	Receipts for installation of oil well machinery -----	<u>67.4</u>
	Net (increase) -----	67.4
I-0 11 and 12 Construction <u>2/</u>		
4.0000	Receipts from landscaping -----	-200.0
8.0000	Receipts for installation of oil well machinery -----	-67.4
66.0000	Installation of central switching equipment -----	-700.2
69.0100	Receipts from the sale of machinery and equipment -----	-81.6
69.0200	Receipts from sale of construction materials and household appliances not considered part of the value of put-in-place construction -----	-183.8
71.0200	Real estate activity of operative builders -----	1,633.7
72.0200	Receipts for installation of refrigeration equipment -----	-383.0
73.0100	Receipts from rental of equipment -----	-1,130.0
40.0400	Installation receipts -----	59.2
40.0500	Installation receipts -----	22.3
40.0600	Installation receipts -----	46.2
40.0700	Installation receipts -----	42.6
40.0800	Installation receipts -----	11.7
40.0901	Installation receipts -----	5.7
40.0902	Installation receipts -----	24.0
46.0100	Installation receipts -----	50.0
46.0200	Installation receipts -----	9.1
49.0100	Installation receipts -----	9.9

1/ See last page of table A.

2/ Includes new construction (I-0 11) and maintenance and repair construction (I-0 12).

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) <u>1/</u>	Affected industry	Amount
I-0 11 and 12 Construction <u>2/</u> (con.)		
49.0700	Installation receipts -----	2.2
52.0300	Installation receipts -----	3.4
62.0100	Installation receipts -----	6.6
62.0200	Installation receipts -----	57.5
69.0100	Receipts for installing and repairing plumbing and heating equipment -----	24.5
69.0200	Receipts for oil and gas burner installation and services by fuel oil dealers -----	176.9
69.0200	Receipts for installing and repairing glass and screens by retailers -----	137.4
72.0200	Receipts for repair of central air conditioning -----	50.3
73.0100	Receipts for septic tank and furnace cleaning -----	185.5
	Net (decrease) -----	-3,454.7
14.0101 Meat packing plants		
4.0000	Receipts for custom slaughtering -----	13.0
69.0100	Receipts for cutting and selling purchased carcasses ----	2,406.9
	Net (increase) -----	2,419.9
14.0102 Sausages and other prepared meats		
69.0100	Receipts for meats prepared in manufacturers' sales branches -----	222.0
	Net (increase) -----	222.0
14.0103 Poultry dressing plants		
69.0100	Receipts for poultry dressing performed in wholesale trade establishments -----	420.4
	Net (increase) -----	420.4

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
14.1502 Prepared feeds, n.e.c.		
69.0100	Receipts by grain elevators and farm supply stores for custom-prepared feed -----	<u>1,248.6</u>
	Net (increase) -----	1,248.6
14.1801 Bread, cake, and related products		
69.0200	Receipts for the sale of bakery products produced on the same premises by retail bakeries -----	<u>1,340.0</u>
	Net (increase) -----	1,340.0
15.0200 Tobacco stemming and rederying		
69.0100	Receipts for stemming and drying tobacco at wholesale establishments -----	957.5
-----	Computed value for Census undercoverage of stemming and drying receipts -----	<u>437.2</u>
	Net (increase) -----	1,394.7
16.0100 Broadwoven fabric mills and fabric finishing plants		
69.0100	Receipts for "converters" who buy goods in the grey, have them finished on contract, and sell at wholesale -----	2,307.7
-----	Receipts of central administrative offices for fabrics finished on contract for them -----	<u>2,694.9</u>
	Net (increase) -----	5,002.6
17.1002 Textile goods, n.e.c.		
69.0100	Receipts for "converters" who buy wool, have it combed and converted to tops on contract, and sell at wholesale -----	<u>66.3</u>
	Net (increase) -----	66.3

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-O Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
18.0400 Apparel made from purchased materials		
64.1200	Receipts for apparel sales from establishments primarily engaged in dressing and dyeing of furs -----	42.6
69.0200	Receipts for custom tailoring, dressmaking, and fur goods production by retailers -----	<u>201.4</u>
	Net (increase) -----	244.0
20.0100 Logging camps and logging contractors		
-----	Conversion of purchased stumpage to logs and bolts shipments -----	880.0
-----	Computed value for undercoverage of Census of logs and bolts -----	<u>1,105.2</u>
	Net (increase) -----	1,985.2
27.0100 Industrial inorganic and organic chemicals		
38.0400	Receipts from establishments primarily producing alumina -----	<u>-487.1</u>
	Net (decrease) -----	-487.1
27.0403 Explosives		
-----	Computed value for shipments of explosives from government-owned, contractor-operated plants -----	<u>153.1</u>
	Net (increase) -----	153.1
38.0100 Primary copper		
-----	Computed value for Census undercoverage of primary copper refined on contract (toll processed) -----	<u>461.3</u>
	Net (increase) -----	461.3

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
38.0400 Primary aluminum		
27.0100	Receipts from establishments primarily producing alumina -----	<u>487.1</u>
	Net (increase) -----	487.1
I-0 40.0400 Fabricated structural metal		
11.0000	Installation receipts -----	<u>-59.2</u>
	Net (decrease) -----	-59.2
I-0 40.0500 Metal doors, sash, and trim		
11.0000	Installation receipts -----	<u>-22.3</u>
	Net (decrease) -----	-22.3
I-0 40.0600 Fabricated plate work (boiler shops)		
11.0000	Installation receipts -----	<u>-46.2</u>
	Net (decrease) -----	-46.2
I-0 40.0700 Sheet metal work		
11.0000	Installation receipts -----	<u>-42.6</u>
	Net (decrease) -----	-42.6
I-0 40.0800 Architectural metal work		
11.0000	Installation receipts -----	<u>-11.7</u>
	Net (decrease) -----	-11.7

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 40.0901 Prefabricated metal buildings		
11.0000	Installation receipts -----	<u>-5.7</u>
	Net (decrease) -----	-5.7
I-0 40.0902 Miscellaneous metal work		
11.0000	Installation receipts -----	<u>-24.0</u>
	Net (decrease) -----	-24.0
I-0 46.0100 Elevators and moving stairways		
11.0000	Installation receipts -----	<u>-50.0</u>
	Net (decrease) -----	-50.0
I-0 46.0200 Conveyors and conveying equipment		
11.0000	Installation receipts -----	<u>-9.1</u>
	Net (decrease) -----	-9.1
I-0 49.0100 Pumps and compressors		
11.0000	Installation receipts -----	<u>-9.9</u>
	Net (decrease) -----	-9.9
I-0 49.0700 General industrial machinery, n.e.c.		
11.0000	Installation receipts -----	<u>-2.2</u>
	Net (decrease) -----	-2.2

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 50.0001 Carburetors, pistons, rings, valves		
69.0100	Receipts for rebuilt carburetors produced in wholesale trade -----	<u>69.9</u>
	Net (increase) -----	69.9
I-0 51.0101 Electronic computing equipment		
-----	Revaluation of computers purchased by a subsidiary or used by the manufacturer in a leasing operation from a "commercial" or "market" value to a cost basis --	<u>-433.5</u>
	Net (decrease) -----	-433.5
I-0 52.0300 Refrigeration and heating equipment		
11.0000	Installation receipts -----	<u>-3.4</u>
	Net (decrease) -----	-3.4
I-0 59.0302 Motor vehicle parts and accessories		
69.0100	Receipts for rebuilt motor vehicle parts (excluding) carburetors) produced in wholesale trade: -----	<u>1,086.2</u>
	Net (increase) -----	1,086.2
I-0 61.0100 Ship building and repair		
-----	Construction differential subsidy paid by the Federal Government to the shipyard and included by Census in receipts -----	<u>-144.4</u>
	Net (decrease) -----	-144.4

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 61.0200 Boat building and repairing		
69.0200	Receipts by boat dealers for boat repairs -----	78.7
65.0400	Receipts by marinas for boat repairs -----	<u>114.5</u>
	Net (increase) -----	193.2
I-0 61.0300 Railroad equipment		
65.0100	Rebuilding, building, and repairing of locomotives and cars on their own account in repair shops owned and operated by railroads -----	<u>127.3</u>
	Net (increase) -----	127.3
I-0 62.0100 Engineering and scientific instruments		
11.0000	Installation receipts -----	<u>-6.6</u>
	Net (decrease) -----	-6.6
I-0 62.0200 Mechanical measuring devices		
11.0000	Installation receipts -----	<u>-57.5</u>
	Net (decrease) -----	-57.5
I-0 64.0102 Jewelers materials and lapidary work		
69.0100	Receipts for lapidary work performed in wholesale trade establishments -----	<u>345.2</u>
	Net (increase) -----	345.2
I-0 64.1200 Manufacturing industries, n.e.c.		
18.0400	Receipts for apparel sales from establishments primarily engaged in dressing and dyeing of furs -----	<u>-42.6</u>
	Net (decrease) -----	-42.6

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-O Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-O 65.0100 Railroads and related services		
61.0300	Rebuilding, building, and repairing of locomotives and cars on their own account in repair shops owned and operated by railroads -----	-127.3
74.0000	Receipts from the sale of food and beverages -----	<u>-15.6</u>
	Net (decrease) -----	-142.9
I-O 65.0300 Motor freight transportation and warehousing		
4.0000	Receipts from the transportation of farm workers for others -----	2.8
69.0100	Merchant wholesalers receipts for storing grain and other CCC products -----	97.0
69.0200	Sale of unclaimed merchandise by warehouses -----	<u>-76.6</u>
	Net (increase) -----	23.2
I-O 65.0400 Water transportation		
61.0200	Receipts by marinas for boat repairs -----	-114.5
69.0200	Receipts from the sale of merchandise on board boats -----	-1.4
69.0200	Receipts by boat dealers for boat storage -----	16.0
74.0000	Receipts from the sale of meals on boats -----	-3.4
74.0000	Receipts from the sale of meals by marinas -----	<u>-23.0</u>
	Net (decrease) -----	-126.3
I-O 65.0500 Air transportation		
69.0200	Receipts for merchandise sold at airports -----	-90.7
74.0000	Receipts for drinks sold on airplanes -----	-33.1
76.0100	On plane cinema fees -----	<u>-14.2</u>
	Net (decrease) -----	-138.0
I-O 66.0000 Communications, except radio and TV		
11.0000	Installation of central switching equipment -----	<u>700.2</u>
	Net (increase) -----	700.2

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 69.0100 Wholesale trade		
4.0000	Crop and livestock services performed in wholesale trade establishments -----	-256.6
12.0000	Receipts for installing and repairing plumbing and heating -----	-24.5
14.0101	Receipts for cutting and selling purchased carcasses -----	-2,406.9
14.0102	Receipts for meats prepared in manufacturers sales branches -----	-222.0
14.0103	Receipts for poultry dressing performed in wholesale trade establishments -----	-420.4
14.1502	Receipts by grain elevators and farm supply stores for custom prepared feeds -----	-1,248.6
15.0200	Receipts for stemming and drying tobacco at wholesale establishments -----	-957.5
16.0100	Receipts of "converters" who buy goods in the grey, have them finished on contract, and sell at wholesale -----	-2,307.7
17.1002	Receipts of "converters" who buy wool, have it combed and converted to tops on contract, and sell at wholesale -----	-66.3
50.0001	Receipts for rebuilt carburetors produced in wholesale trade -----	-69.9
59.0302	Receipts for rebuilt motor vehicle parts (excluding carburetors) produced in wholesale trade -----	-1,086.2
64.0102	Receipts for lapidary work performed in wholesale trade establishments -----	-345.2
65.0300	Merchant wholesalers receipts for storing grain and and other CCC products -----	-97.0
72.0200	Receipts for electrical repair work -----	-2,680.1
73.0100	Receipts of sales branches and other wholesalers for computers, photocopying, and other miscellaneous machine rental and repair -----	-7,287.6
75.0000	Receipts for auto repair and allied services -----	-1,029.3
4.0000	Receipts from the resale of agricultural supplies, i.e., fertilizer, feeds, etc. -----	9.5
11 & 12	Receipts from the sale of machinery and equipment -----	81.6
73.0100	Receipts for merchandise including the sale of used equipment, i.e., computers, etc. -----	562.1
	Net (decrease) -----	-19,852.6

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-O Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected Industry	Amount
I-O 69.0200 Retail trade		
12.0000	Receipts for oil and gas burner installation and service by fuel oil dealers -----	-176.9
12.0000	Receipts for installing and repairing glass and screens by retailers -----	-137.4
14.1801	Receipts for the sale of bakery products produced on the same premise by retail bakeries -----	-1,340.0
18.0400	Receipts for custom tailoring, dressmaking, and fur goods production by retailers -----	-201.4
61.0200	Receipts by boat dealers for boat repairs -----	-78.7
65.0400	Receipts by boat dealers for boat storage -----	-16.0
72.0200	Department store and other retail store receipts for cleaning services, portraits, repair work (electrical, jewelry, TV, shoe, appliance), and furniture reupholstering, etc. -----	-2,279.5
72.0300	Department store receipts for beauty and barber services--	-20.9
73.0100	Retail store receipts for photofinishing, interior decorating, and certain equipment rental -----	-798.4
74.0000	Lunch counter, refreshment stand, and dining room receipts for prepared foods and drinks for immediate consumption -----	-3,289.7
75.0000	Receipts for automotive repair performed by shops primarily engaged in the sale of automobiles (auto dealers) or parts -----	-10,722.8
75.0000	Receipts for automotive rental, washing, and allied services -----	-732.3
76.0200	Receipts by retailers for the rental of boats, motorcycles, bicycles, and other sporting equipment ----	-68.2
4.0000	Receipts from the resale of animals, nursery products, etc. -----	22.5
11 & 12	Receipts from the sale of construction materials and household appliances not considered part of the value of put-in-place construction -----	183.8
65.0300	Sale of unclaimed merchandise by warehouses -----	76.6
65.0400	Receipt from the sale of merchandise on board boats -----	1.4
65.0500	Receipts for merchandise sold at airports -----	90.7
72.0100	Receipts for merchandise sales (gasoline, liquor, newspapers, candy, etc.) at hotels, motels, and camps -----	232.4
72.0200	Sale of merchandise by laundries, repair shops, and other personal service establishments -----	599.3

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) <u>1/</u>	Affected industry	Amount
I-0 69.0200 Retail trade (con.)		
72.0300	Sale of merchandise by beauty and barber shops -----	55.9
73.0100	Sale of merchandise by business service establishments ---	360.9
74.0000	Sale of merchandise by eating and drinking establishments-	737.5
75.0000	Sale of merchandise by automobile repair and allied service establishments -----	405.1
76.0200	Sale of merchandise by bowling alleys, amusement parks, etc. -----	614.7
77.0400	Sale of merchandise (books, supplies, etc.) by private schools -----	281.2
77.0500	Sale of merchandise by museums, clubs, social organizations, and other membership organizations -----	<u>1,600.6</u>
	Net (decrease) -----	-14,599.6
I-0 71.0200 Real estate		
11.0000	Real estate activity of operative builders -----	1,633.7
73.0300	Royalty receipts of writers, etc. -----	<u>715.8</u>
	Net (increase) -----	2,349.5
I-0 72.0100 Hotels and lodging places		
69.0200	Receipts for merchandise sales (gasoline, liquor, newspapers, candy, etc.) at hotels, motels, and camps -----	-232.4
72.0200	Receipts for laundry and valet services -----	-27.1
72.0300	Beauty and barber shop receipts -----	-38.0
74.0000	Receipts of restaurants and lunch counters operated by hotels -----	-2,999.3
76.0200	Receipts for room rental in social and recreational membership clubs -----	8.5
77.0400	Revenue from housing provided by private colleges -----	<u>424.5</u>
	Net (decrease) -----	-2,863.8

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) <u>1/</u>	Affected industry	Amount
I-0 72.0200 Personal and repair services		
12.0000	Receipts for repair of central air conditioning -----	-50.3
69.0200	Sale of merchandise by laundries, repair shops, and other personal service establishments -----	-599.3
73.0100	Receipts for commercial photographic services performed by photographic studios -----	-19.1
11 & 12	Receipts for the installation of refrigeration equipment -----	383.0
69.0100	Receipts for electrical repair work -----	2,680.1
69.0200	Department store and other retail store receipts for cleaning services, portraits, repair work (electrical, jewelry, TV, shoe, appliance), and furniture reupholstering, etc. -----	2,279.5
72.0100	Receipts for laundry and valet services -----	27.1
73.0100	Receipts for locksmith services and the repair of musical instruments, bicycles, and leather goods -----	120.3
	Net (increase) -----	4,821.3
I-0 72.0300 Beauty and barber shops		
69.0200	Sale of merchandise by beauty and barber shops -----	-55.9
69.0200	Department store receipts for beauty and barber services -	20.9
72.0100	Beauty and barber shop receipts of hotels, etc. -----	38.0
	Net (increase) -----	3.0
I-0 73.0100 Miscellaneous business services		
12.0000	Receipts for septic tank and furnace cleaning -----	-185.5
69.0100	Receipts for merchandise including the sale of used equipment, i.e., computers, etc. -----	-562.1
69.0200	Sale of merchandise by business service establishments ---	-360.9
72.0200	Receipts for locksmith services and the repair of musical instruments, bicycles, and leather goods -----	-120.3
73.0300	Receipts for engineering and architectural services -----	-94.9
11 & 12	Receipts from the rental of construction equipment -----	1,130.0
69.0100	Receipts of sales branches and other wholesalers for computers, photocopying, and other miscellaneous machine rental and repair -----	7,287.6
69.0200	Retail store receipts for photofinishing, interior decorating, and certain equipment rental -----	798.4

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 73.0100 Miscellaneous business services (con.)		
72.0200	Receipts for commercial photographic services performed by photographic studios -----	19.1
73.0300	Receipts for consulting services -----	90.8
74.0000	Rental receipts for catering supplies, party equipment, etc. -----	120.0
	Net (increase) -----	8,122.2
I-0 73.0300 Miscellaneous professional services		
71.0200	Royalty receipts of writers, etc. -----	-715.8
73.0100	Receipts for consulting services -----	-90.8
4.0000	Receipts for accounting services performed for others ----	0.9
73.0100	Receipts for engineering and architectural services -----	94.9
	Net (decrease) -----	-710.8
I-0 74.0000 Eating and drinking places		
69.0200	Sale of merchandise by eating and drinking establishments -----	-737.5
73.0100	Rental receipts for catering supplies, party equipment, etc. -----	-120.0
65.0100	Receipts from the sale of food and beverages -----	15.6
65.0400	Receipts from the sale of meals on boats and at marinas --	26.4
65.0500	Receipts for drinks sold on airplanes -----	33.1
69.0200	Lunch counter, refreshment stand, and dining room receipts for prepared foods and drinks for immediate consumption -----	3,289.7
72.0100	Receipts of restaurants and lunch counters operated by hotels -----	2,999.3
76.0100	Receipts at refreshment stands and vending machines operated by theater owners -----	229.1
76.0200	Receipts from the sale of meals and beverages at bowling alleys, race tracks, golf courses, amusement parks, sports events, and clubs, etc. -----	1,102.0
77.0400	Board receipts by private schools -----	492.2

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-O Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-O 74.0000 Eating and drinking places (con.)		
77.0500	Sale of meals and beverages by social and fraternal clubs, museums, etc. -----	491.9
78.0400	Receipts for food and beverage sales by Army-Air Force civilian post restaurants, officers' and enlisted men's clubs, and VA canteens -----	<u>340.7</u>
	Net (increase) -----	8,162.5
I-O 75.0000 Automobile repair and services		
69.0200	Sale of merchandise by automobile repair and allied service establishments -----	-405.1
69.0100	Receipts for auto repair and allied services -----	1,029.3
69.0200	Receipts for automotive repair performed by shops primarily engaged in the sale of automobiles (auto dealers) or parts -----	10,722.8
69.0200	Receipts for automotive rental, washing, and allied services -----	<u>732.3</u>
	Net (increase) -----	12,079.3
I-O 76.0100 Motion pictures		
74.0000	Receipts at refreshment stands and vending machines operated by theater owners -----	-229.1
65.0500	On plane cinema fees -----	<u>14.2</u>
	Net (decrease) -----	-214.9
I-O 76.0200 Amusement and recreation services		
69.0200	Sale of merchandise by bowling alleys, amusement parks, etc. -----	-614.7
72.0100	Receipts for room rental in social and recreational membership clubs -----	-8.5
74.0000	Receipts from the sale of meals and beverages at bowling alleys, race tracks, golf courses, amusement parks, sports events, and clubs, etc. -----	-1,102.0

Table A.--Specific Redefinitions and Coverage
Adjustments in the 1972 I-0 Table
(Millions of dollars)
- continued -

From or to (-) 1/	Affected industry	Amount
I-0 76.0200 Amusement and recreation services (con.)		
69.0200	Receipts by retailers for the rental of boats, motorcycles, bicycles, and other sporting equipment -----	68.2
77.0400	Admission fees to athletic events at private colleges and universities -----	81.1
	Net (decrease) -----	-1,575.9
I-0 77.0400 Educational services		
69.0200	Sale of merchandise (books, supplies, etc.) by private schools -----	-281.2
72.0100	Revenue from housing provided by private colleges -----	-424.5
74.0000	Board receipts by private schools -----	-492.2
76.0200	Admission fees to athletic events at private colleges and universities -----	-81.1
	Net (decrease) -----	-1,279.0
I-0 77.0500 Nonprofit organizations		
69.0200	Sales of merchandise by museums, clubs, social organizations, and other membership organizations -----	-1,600.6
74.0000	Sale of meals and beverages by social and fraternal clubs, museums, etc. -----	-491.9
	Net (decrease) -----	-2,092.5
I-0 78.0400 Other Federal Government enterprises		
74.0000	Receipts for food and beverages sales by Army-Air Force civilian post restaurants, officers' and enlisted mens' clubs, and VA canteens -----	-340.7
	Net (decrease) -----	-340.7

1/ If the redefinition is positive, the affected industry was assigned additional output; a negative sign means that the output was taken from the affected industry and assigned to the industry shown in the left column.

Table B.--Commodity Reclassifications in the 1972 I-0 Table Which
Change SIC Primary Products to I-0 Secondary Products
(Millions of dollars)

Commodity classification		Commodity	Value
From initial I-0	To final I-0		
1.0100	14.0600	Milk processed and bottled on the farm ----	1,838.0
1.0302	3.0000	Raw furs (mink pelts, etc.) -----	57.7
8.0000	31.0100	Liquefied petroleum gases -----	836.5
9.0000	36.1900	Ground, pulverized, and otherwise treated clay, ceramic, and refractory minerals, processed in conjunction with mining or quarrying operations--includes ground talc and gypsum -----	38.8
10.0000	27.0100	Natural sodium, borate, and potassium salts processed (mined, milled, etc.) at the mine site -----	259.3
10.0000	36.1900	Barite ground, pulverized, or otherwise treated in conjunction with mining or quarrying operations -----	22.2
14.0101	1.0301	Pulled wool -----	4.6
14.0101	14.0102	Sausages and meat specialties produced from animals slaughtered at the same plant -----	3,418.8
14.1401	14.1403	Prepared flour mixes or doughs produced from grains milled at the same plant ----	143.5
14.1802	14.3200	Cracker sandwiches made from crackers produced at the same plant -----	65.0
14.2002	14.2001	Confectionery-type chocolate and cocoa products made from cocoa beans ground at the same plant -----	288.7
14.3200	14.2002	Chocolate and cocoa products made from purchased chocolate -----	55.9
16.0100	19.0200	Woven bedspreads, towels, sheets, etc., made in weaving mills -----	632.3
16.0300	16.0200	Finishing and printing of purchased narrow fabrics -----	17.4
18.0201	18.0400	Knit outerwear made from yarns or fabrics knit at the same plant -----	1,365.3
18.0202	18.0400	Knit underwear made from yarns or fabrics knit at the same plant -----	481.5
18.0203	19.0200	Knit bedspreads, towels, washcloths, etc., made from yarns or fabrics knit at the same plant -----	87.1
24.0701	24.0200	Coated paper produced in establishments without papermaking equipment -----	111.8
26.0100	73.0200	Newspaper receipts from advertising -----	5,941.7
26.0200	73.0200	Periodical receipts from advertising -----	1,805.9
26.0400	73.0200	Catalogs, directories, and shopping news --	427.1

Table B.--Commodity Reclassifications in the 1972 I-0 Table Which
Change SIC Primary Products to I-0 Secondary Products
(Millions of dollars)
- continued -

Commodity classification		Commodity	Value
From initial I-0	To final I-0		
26.0501	73.0200	Catalogs, directories, and advertising printing, regardless of process -----	4,331.5
26.0803	73.0200	Lithographic platemaking services of an advertising nature -----	111.7
26.0803	73.0200	Typesetting of advertising material -----	232.7
26.0804	73.0200	Photoengraving plates of an advertising nature -----	94.1
26.0805	73.0200	Electrotyping and stereotyping duplicate plates of an advertising nature -----	10.7
27.0202	27.0201	Mixed fertilizers produced from purchased materials -----	651.9
31.0100	27.0100	Liquefied refinery gases, aliphatics, and aromatics for chemical use as feedstocks, etc. -----	1,457.9
36.1900	36.2100	Dead burned magnesite -----	32.2
37.0101	27.0100	Coke oven tar and light oil derivatives ---	30.7
37.0101	27.0201	Coke oven ammonia -----	8.1
37.0101	37.0102	Ferroalloys made in blast furnaces -----	42.1
37.0101	37.0300	Seamless rolled ring ferrous forgings produced in steel mills -----	266.1
37.0101	68.0200	Coke oven gas -----	21.3
37.0103	37.0101	Steel wire not produced in steel mills ----	328.7
37.0103	42.0500	Noninsulated wire, rope, cable, strand, fencing, and other wire products made in wire drawing mills -----	865.9
37.0104	37.0101	Cold rolled steel sheet, strip, and bars not produced in hot rolling mills -----	1,487.1
37.0105	37.0101	Welded or seamless steel pipe and tubes not made in steel mills -----	1,264.5
38.0600	38.0100	Secondary recovery (from scrap and dross) of copper -----	560.0
38.0600	38.0200	Secondary recovery (from scrap and dross) of lead -----	284.6
38.0600	38.0300	Secondary recovery (from scrap and dross) of zinc -----	122.0
38.0600	38.0400	Secondary recovery (from scrap and dross) of aluminum -----	408.6
38.0600	38.0500	Secondary recovery (from scrap and dross) of nonferrous metals, n.e.c. -----	343.0
38.0800	38.0400	Aluminum extrusions, billets and ingots, produced in rolling mills -----	167.1

Table B.--Commodity Reclassification in the 1972 I-0 Table Which
Change SIC Primary Products to I-0 Secondary Products
(Millions of dollars)
- continued -

Commodity classification		Commodity	Value
From initial I-0	To final I-0		
38.0800	38.1000	Aluminum wire and cable made in rolling mills -----	61.0
38.0900	38.1000	Nonferrous wire, excluding copper and aluminum, produced in rolling mills -----	61.4
38.1000	42.0500	Nonferrous wire cloth and other woven wire products made in nonferrous wire drawing plants -----	33.9
58.0500	38.1000	Appliance wire and cord and flexible cord sets manufactured from purchased insulated wire -----	103.4
59.0100	59.0301	Complete vehicles (except passenger cars and motor homes) produced from purchased chassis -----	765.1
64.1100	73.0200	Advertising displays and specialties -----	587.4
66.0000	73.0200	Receipts for telephone directory advertising -----	901.2
67.0000	73.0200	Commercial time sales -----	4,449.6
67.0000	76.0200	Talent performances by radio and TV performers -----	59.3
72.0100	71.0200	Room receipts from permanent guests -----	227.3
73.0100	73.0200	Direct mail advertising services, graphic, and other activities relating to advertising -----	1,410.0
76.0100	73.0200	Receipts from screen advertising and production of TV commercials -----	87.9
77.0300	77.0100	Payments to doctors in group prepayment plans, HMO's, etc. -----	396.0

Table C.--Imputations for Force Account Construction, 1972
(Millions of dollars)

From I-0	Value	From I-0	Value	From I-0	Value	From I-0	Value
3.0000	4.3	14.1900	6.0	18.0202	0.7	24.0200	37.3
4.0000	29.4	14.2001	4.9	18.0203	0.1	24.0300	20.3
5.0000	104.6	14.2002	0.8	18.0300	2.3	24.0400	2.3
6.0100	81.2	14.2003	0.6	18.0400	18.8	24.0500	2.6
6.0200	45.2	14.2101	8.4	19.0100	1.8	24.0602	3.5
7.0000	102.8	14.2102	0.3	19.0200	2.6	24.0701	3.7
8.0000	861.5	14.2103	1.5	19.0301	0.4	24.0702	4.8
9.0000	84.2	14.2104	3.0	19.0302	0.6	24.0703	1.5
10.0000	22.6	14.2200	19.8	19.0303	0.9	24.0704	0.6
13.0100	30.4	14.2300	1.6	19.0304	1.5	24.0705	1.4
13.0200	14.1	14.2400	1.1	19.0305	0.3	24.0706	1.8
13.0300	1.5	14.2500	1.8	19.0306	1.7	25.0000	21.8
13.0500	4.3	14.2600	0.2	20.0100	3.4	26.0100	12.1
13.0600	3.6	14.2700	2.3	20.0200	25.7	26.0200	2.2
13.0700	6.3	14.2800	2.5	20.0300	4.8	26.0301	2.0
14.0101	18.4	14.2900	2.5	20.0400	1.0	26.0302	1.4
14.0102	6.7	14.3000	1.4	20.0501	11.0	26.0400	1.3
14.0103	9.0	14.3100	1.5	20.0502	5.9	26.0501	11.3
14.0104	1.7	14.3200	13.3	20.0600	10.7	26.0502	0.3
14.0200	0.2	15.0101	5.6	20.0701	1.9	26.0601	1.3
14.0300	1.3	15.0102	2.0	20.0702	3.9	26.0602	0.9
14.0400	0.7	15.0103	0.5	20.0800	2.8	26.0700	0.8
14.0500	1.1	15.0200	1.7	20.0901	3.5	26.0801	0.3
14.0600	6.8	16.0100	44.7	20.0902	2.0	26.0802	0.9
14.0700	1.7	16.0200	3.3	20.0903	15.6	26.0803	0.9
14.0800	3.4	16.0300	19.5	21.0000	1.7	26.0804	0.3
14.0900	10.5	16.0400	1.4	22.0101	15.3	27.0100	124.2
14.1000	1.4	17.0100	6.8	22.0102	0.8	27.0201	6.9
14.1100	2.4	17.0200	0.6	22.0103	2.2	27.0202	3.3
14.1200	2.8	17.0300	0.3	22.0200	10.6	27.0300	3.5
14.1300	9.5	17.0400	0.6	22.0300	4.0	27.0401	1.5
14.1401	2.6	17.0500	0.5	22.0400	3.6	27.0402	3.7
14.1402	2.1	17.0600	2.4	23.0100	1.3	27.0403	4.7
14.1403	1.3	17.0700	1.3	23.0200	3.2	27.0404	2.5
14.1501	2.4	17.0900	1.2	23.0300	2.4	27.0405	0.7
14.1502	7.2	17.1001	1.4	23.0400	3.6	27.0406	9.2
14.1600	0.7	17.1002	1.1	23.0500	3.0	28.0100	14.6
14.1700	2.0	18.0101	1.3	23.0600	1.4	28.0200	3.2
14.1801	8.4	18.0102	0.9	23.0700	1.6	28.0300	6.6
14.1802	1.8	18.0201	1.9	24.0100	3.1	28.0400	27.1

Table C.--Imputations for Force Account Construction, 1972
(Millions of dollars)
- continued -

From I-0	Value	From I-0	Value	From I-0	Value	From I-0	Value
29.0100	27.1	36.1400	5.4	40.0700	2.4	48.0500	3.7
29.0201	2.9	36.1500	2.5	40.0800	0.6	48.0600	11.2
29.0200	2.3	36.1600	4.1	40.0901	0.6	49.0100	12.1
29.0203	0.6	36.1700	3.5	40.0902	8.1	49.0200	7.8
29.0300	4.4	36.1800	4.7	41.0100	4.5	49.0300	3.6
30.0000	17.4	36.1900	1.6	41.0201	25.3	49.0400	1.3
31.0100	71.7	36.2000	3.1	41.0202	1.6	49.0500	7.8
31.0200	5.5	36.2100	9.0	41.0203	18.8	49.0600	2.1
31.0300	6.2	36.2200	1.0	42.0100	2.1	49.0700	5.7
32.0100	12.9	37.0101	504.1	42.0201	6.1	50.0001	5.1
32.0200	3.8	37.0102	7.4	42.0202	1.0	50.0002	30.4
32.0301	0.1	37.0103	10.8	42.0300	15.6	51.0101	7.9
32.0302	10.2	37.0104	7.1	42.0401	14.0	51.0102	1.1
32.0400	28.6	37.0105	8.3	42.0402	7.0	51.0200	0.8
35.0500	3.4	37.0200	76.5	42.0500	14.4	51.0300	0.3
33.0001	1.3	37.0300	12.0	42.0700	2.1	51.0400	0.9
34.0100	0.1	37.0401	6.1	42.0800	28.3	52.0100	1.8
34.0201	2.4	37.0402	2.8	42.1000	1.4	52.0200	0.3
34.0202	0.1	38.0100	6.4	42.1100	15.6	52.0300	19.9
34.0301	0.3	38.0200	1.0	43.0100	3.0	52.0400	1.1
34.0302	0.8	38.0300	2.3	43.0200	6.1	52.0500	3.1
34.0303	1.0	38.0400	11.3	44.0001	18.4	53.0100	6.4
34.0304	0.5	38.0500	2.5	44.0002	3.7	53.0200	5.5
34.0305	0.3	38.0600	7.6	45.0100	19.9	53.0300	5.6
35.0100	29.7	38.0700	13.8	45.0200	3.1	53.0400	11.0
35.0200	15.5	38.0800	28.0	45.0300	5.3	53.0500	5.9
36.0100	46.0	38.0900	6.6	46.0100	2.3	53.0600	1.8
36.0200	2.4	38.1000	25.2	46.0200	4.0	53.0700	8.0
36.0300	0.8	38.1100	20.1	46.0300	2.5	53.0800	2.4
36.0400	1.1	38.1200	5.7	46.0400	3.8	54.0100	4.4
36.0500	0.8	38.1300	7.5	47.0100	6.0	54.0200	6.5
36.0600	0.7	38.1400	2.3	47.0200	2.8	54.0300	4.5
36.0701	0.4	39.0100	17.4	47.0300	16.6	54.0400	9.7
36.0702	0.5	39.0200	2.6	47.0401	2.7	54.0500	2.2
36.0800	1.0	40.0100	2.8	47.0402	1.2	54.0600	1.0
36.0900	0.7	40.0200	4.7	47.0403	1.6	54.0700	2.7
36.1000	8.7	40.0300	7.9	48.0100	5.0	55.0100	3.7
36.1100	2.6	40.0400	4.9	48.0200	5.1	55.0200	8.6
36.1200	41.4	40.0500	1.6	48.0300	2.1	55.0300	9.0
36.1300	3.2	40.0600	3.7	48.0400	2.3	56.0100	10.7

Table C.--Imputations for Force Account Construction, 1972
(Millions of dollars)
- continued -

From I-0	Value	From I-0	Value	From I-0	Value
56.0200	2.5	64.0101	3.0	70.0200	9.3
56.0300	16.6	64.0102	0.7	70.0300	5.6
56.0400	39.4	64.0104	0.8	70.0400	19.5
57.0100	5.8	64.0105	1.4	70.0500	5.4
57.0200	11.7	64.0200	1.6	71.0200	1,121.9
57.0300	23.0	64.0301	5.3	72.0100	195.9
58.0100	2.7	64.0302	0.7	72.0200	285.7
58.0200	1.0	64.0400	4.9	72.0300	1.4
58.0300	1.4	64.0501	0.7	73.0100	136.2
58.0400	6.9	64.0502	0.4	73.0200	26.9
58.0500	2.4	64.0503	0.5	73.0300	54.7
59.0100	5.9	64.0504	0.4	75.0000	20.5
59.0200	3.5	64.0600	0.3	76.0100	5.4
59.0301	47.3	64.0701	0.2	76.0200	75.4
59.0302	55.7	64.0702	1.3	77.0100	6.5
60.0100	24.8	64.0800	1.2	77.0200	282.4
60.0200	21.8	64.0900	0.4	77.0300	45.4
60.0400	16.4	64.1000	1.0	77.0400	122.9
61.0100	16.7	64.1100	3.2	77.0500	328.9
61.0200	4.6	64.1200	4.3	77.0600	4.2
61.0300	1.7	65.0100	1,754.0	77.0700	4.6
61.0500	0.7	65.0200	7.9	77.0800	6.8
61.0601	1.0	65.0300	56.1	77.0900	5.8
61.0602	1.6	65.0400	18.4	78.0100	11.0
61.0700	0.9	65.0500	20.6	78.0200	443.3
62.0100	6.3	65.0600	90.0	78.0400	3.5
62.0200	11.6	65.0700	19.1	79.0100	181.1
62.0300	1.6	66.0000	2,740.1	79.0200	432.0
62.0400	2.9	67.0000	8.0	79.0300	2,454.9
62.0500	3.7	68.0100	3,071.1	96.0000	220.4
62.0600	1.0	68.0200	905.8	97.0000	1,198.1
62.0700	2.5	68.0300	37.8	98.0000	1,804.4
63.0100	1.4	69.0100	32.1	99.1000	189.0
63.0200	1.9	69.0200	83.9	99.2000	85.7
63.0300	26.6	70.0100	23.3	99.3000	4,980.0

GRAND TOTAL - 27,996.2



Appendix A Industry and Commodity Definitions for the 1972 Input-Output Study

The following definitions refer to the 85-order (two-digit) level of classification, except when special consideration must be given to an industry or a commodity at the more detailed (six-digit) level of the 496-order tables. The intermediate (four-digit) level of classification used for the 365-order tables is not considered explicitly in this appendix, but any discussion at the six-digit level will automatically be relevant to the four-digit definitions (after aggregation).

Appendix C provides the detailed classification system which appeared in the April 1979 *Survey* article on the 1972 I-O study. This classification list shows the two-digit and six-digit composition and the associated SIC numbers. Note that the SIC is not very relevant for the agricultural and construction industries, which are defined essentially on a product basis (for agriculture) and an activity basis (for construction). In addition, the SIC is not specifically applicable to some of the government enterprises classified in the I-O system.

As discussed in the main text of this report, industries and commodities usually have the same I-O codes. The commodity I-O code refers to the primary product of the relevant industry plus all other (secondary) production of that commodity by other industries. There are two commodities (noncomparable imports and scrap, used, and secondhand goods) which have no associated industries. There are five industries for which there are no associated commodities, either because there is no defined output of the industry (the Commodity Credit Corporation, I-O 78.0200) or the commodity was defined to be produced primarily by some other industry (forest products, I-O 2.0701; Federal electric utilities, I-O 78.0200; local government passenger transit, I-O 79.0100; and State and local electric utilities, I-O 79.0200).

A major distinction from earlier tables is the fact that no longer are there transfers of secondary products. As explained in the main text of this report, they are redefined, either explicitly or mechanically. Thus, commodity output is defined to include primary product of primary industry plus all secondary output of the commodity by other industries. The effect in the Use table (table 1) is that there are no transfers from one industry to another, as in earlier I-O tables. Furthermore, there are no transfers of comparable imports to the comparable domestic industry. These imports are part of commodity supply, at domestic port values, and are distributed to consuming industries and final users along with domestic production of the comparable commodity.

Agricultural industries and commodities (I-O's 1 and 2)

The output of the agricultural industries is defined on a commodity rather than an establishment basis (unlike most other areas). The commodity output totals cover farm production for open market sale, for placement under loan with the Commodity Credit Corporation, for farm home consumption, and for farm inventory accumulation (net increase in inventories). The output totals also include certain transactions which are usually netted from the regularly published farm income and output statistics. These transactions cover nonpurchased feed and seed, manure, animal work-power, and interfarm, intrastate shipments of livestock.

The output total for a given commodity covers all farm output of the commodity, whether produced for sale or for own use and whether or not the commodity was produced on farms whose major products were some other commodities. For example, feed grains produced on cattle farms and fed to their own livestock or sold to others are included in the value of output of feed grains (I-O 2.0202).

For purposes of defining farm output, a farm is any tract of land comprising ten or more acres with annual sale of agricultural products of at least \$50. Also included are tracts of land of less than ten acres if the value of sales of agricultural products produced is at least \$250 annually.

Output of agricultural commodities has not been augmented by the relatively minor value of production of farm products attributable to nonfarm households and to industrial establishments, with one exception. Pulled wool, which is produced by meat packing plants (I-O 14.0101), is included with sheared wool in the output of the commodity meat animals (I-O 1.0301). (See list B in chapter VIII.)

The value of farm output does not include the cash subsidies paid directly to farmers. Such subsidies are included in national income originating in farming but excluded from gross product originating in farming. They do not affect I-O industry or commodity total values.

In addition to primary products, the output of the 17 agricultural industries includes receipts for selected secondary activities. The inclusion of these secondary products receipts in the output of industries which are defined primarily on a commodity basis is necessary in order to maintain comparability of coverage with the usual published data on net farm income. The receipts for secondary products are principally associated with farm slaughter of meat animals and production of processed foods for farm home consumption. These secondary products are included in the commodity output of the appropriate processed food commodity group (I-O 14). The real estate and rental activities of the farm industries are no longer considered farm commodities, since for the 1972 I-O study rental activities of all industries have been redefined to the real estate industry (I-O 71.0200).

The following listing of 17 agricultural industries shows the important products for each industry. Not included are secondary products produced on the farm, such as: processed milk, farm slaughtered meats, miscellaneous fur-bearing animals (including mink and silver fox), forest products, dehydrated fruits and vegetables, sugar cane sirup, and receipts for custom work, such as hay baling, plowing, harvesting, and storage by farmers under resale agreements. Fur-bearing animals produced in I-O 1.0302 are primary commodities of I-O 3.0000, Forestry and fishery products. All the forest products shown in I-O 2.0701 are primary commodities of other industries, including I-O 3.0000 and I-O 20.0100, Logging camps and logging contractors.

Industry/
commodity 1/

I-O 1.0100	<u>Dairy farm products</u>
	1. Milk and cream
	2. Manure

1/ Except for fur-bearing animals (part of 1.0302) and forest products (I-O 2.0701), all of the listed products for each industry are also the primary commodity with the same I-O designation.

Industry/
commodity

I-0 1.0200	<u>Poultry and eggs</u> 1. Broilers 2. Chickens 3. Turkeys 4. Eggs 5. Turkey hatching eggs 6. Other poultry 7. Manure
I-0 1.0301	<u>Meat animals</u> 1. Cattle and calves (including dairy heifer replacements) 2. Hogs 3. Sheep and lambs 4. Wool 5. Goats 6. Mohair 7. Manure
I-0 1.0302	<u>Other livestock and products</u> 1. Horses and mules 2. Animal work power 3. Honey 4. Bees 5. Beeswax 6. Miscellaneous animals (rabbits, fur-bearing animals, etc.) 7. Manure
I-0 2.0100	<u>Cotton</u> 1. Cotton lint 2. Cottonseed
I-0 2.0201	<u>Food grains</u> 1. Wheat 2. Rye 3. Rice 4. Buckwheat
I-0 2.0202	<u>Feed grains</u> 1. Corn 2. Hay 3. Pasture 4. Oats 5. Barley 6. Sorghum grain
I-0 2.0203	<u>Grass seeds (including legume seeds)</u> 1. Cowpeas 2. Hayseeds 3. Pasture seeds 4. Cover crop seeds

Industry/
commodity

I-0 2.0300

Tobacco

1. Tobacco
2. Tobacco seeds and plants

I-0 2.0401

Fruits

1. Citrus
2. Noncitrus--apples, apricots, avocados, cherries, dates, figs, grapes, nectarines, olives, peaches, pears, persimmons, pineapples, plums, prunes, and pomegranates
3. Berries--cranberries, strawberries, other
4. Other fruits and nuts (excluding tree nuts)

I-0 2.0402

Tree nuts

1. Almonds
2. Filberts
3. Pecans
4. Walnuts

I-0 2.0501

Vegetables

1. Dry edible beans and peas
2. Potatoes and sweetpotatoes
3. Truck crops
4. Melons
5. Mung beans

I-0 2.0502

Sugar crops

1. Sugar beets
2. Sugarcane and sirup
3. Maple sugar and sirup

I-0 2.0503

Miscellaneous crops

1. Hops
2. Spearmint and peppermint
3. Broomcorn
4. Popcorn
5. Other miscellaneous crops

I-0 2.0600

Oil bearing crops

1. Soybeans
2. Peanuts
3. Flaxseed
4. Tung nuts
5. Safflower seeds

I-0 2.0701

Forest products (does not exist as a commodity)

1. Stumpage
2. Pulpwood
3. Gum naval stores
4. Fuel wood
5. Christmas trees
6. Fence posts and other lumber products

Industry/
commodity

- I-O 2.0702 Greenhouse and nursery products
1. Greenhouse and nursery products (including sod)
2. Roots, herbs, etc.

*Forestry and fishery products and agricultural,
forestry, and fishery services (I-O's 3 and 4)*

Each of these industries are defined almost entirely on a commodity (or activity) basis. Forestry and fishery products have remained combined as one industry/commodity because of lack of sufficient input information to separate the two.

Industry/
commodity

- I-O 3.0000 Forestry and fishery products

Forestry commodity output includes raw furs, standing timber, Christmas trees, tree seeds and seedlings, gums, barks, and miscellaneous forest products (e.g., gum naval stores). The forestry commodity output includes most of the forestry output from the agricultural industry I-O 2.0701, Forest products, which has no commodity output. The forestry commodity also includes the output of fur-bearing animals, from I-O 1.0302, Miscellaneous livestock.

I-O 3.0000 also includes unprocessed fishery products, including both finfish and shellfish. The commodity which is included is that which is taken from the water by fishermen, including fish used for meal and fertilizers and shells, as well as food. The fishery products which are processed on the boat (such as canned tuna) are included only in the appropriate manufacturing industry (I-O's 14.0700 or 14.1200).

- I-O 4.0000 Agricultural, forestry, and fishery services

The industry is defined essentially on a commodity basis with the output including: (1) cotton ginning, fruit picking, crop dusting, harvesting, custom work, and other agriculture services; (2) poultry hatching services; (3) animal breeding services; (4) forestry services; and (5) operation of fish hatcheries. Farmers' receipts for agricultural services are included in the commodity output of I-O 4.0000. See chapter VIII, table A, for a listing of redefinitions affecting I-O 4.0000.

Mining industries (I-O's 5-10)

Mining industries are defined on an establishment basis. Each industry includes the receipts from all production activities, both primary and secondary, of the establishments classified in the specific SIC industries comprising the I-O industry. In general, industry and commodity outputs are based on the values published in the *1972 Census of Mineral Industries*. Modifications from this source are noted below in the definitions of the individual mining industries.

It will also be noted that a number of redefinitions which affect the majority of industries also affect mining. The margins on sales of commodities which have been purchased for resale without additional processing are redefined into wholesale trade; electric energy produced and sold by mining industries has been redefined to become part of the output of I-O 68.0100, Electric services (utilities); rents received by mining industries have been redefined to become part of the output of I-O 71.0200, Real estate. Other modifications, which appear in tables A and B of chapter VIII, are listed below in the specific industry discussion.

Industry/
commodity

I-O 5.0000 Iron and ferroalloy ores mining

There is no modification of this industry from the Census definitions.

I-O 6.0100 Copper ore mining

There is no modification of this industry from the SIC and Census definitions.

I-O 6.0200 Nonferrous metal ores mining, except copper

The commodity output of this industry includes ores of lead and zinc, gold and silver, bauxite, mercury, uranium-radium-vanadium, and a number of others. Also included are metal mining services (SIC 108) except for the building of new access structures associated with sinking of shafts for mining these ores; this latter activity is considered part of construction (I-O 11.0508).

I-O 7.0000 Coal mining

The commodity output of this industry includes bituminous coal, anthracite, and lignite and services associated with coal mining. Excluded from the SIC and Census definitions are the building of new access structures associated with the sinking of shafts for the mining of the three coal items; this activity is considered part of construction (I-O 11.0508).

Industry/
commodity

I-0 8.0000 Crude petroleum and natural gas

The commodity output of this industry includes crude petroleum and natural gas (SIC 1311), natural gas liquids (SIC 1321), and part of oil and gas field services (SIC 138). The output excludes, by redefinition, New petroleum and natural gas well drilling (I-0 11.0503), 2/ New petroleum, natural gas and solid mineral exploration (I-0 11.0504), and maintenance and repair of petroleum and natural gas wells (I-0 12.0215). However, receipts of the construction industry for the installation of oil well machinery are redefined into I-0 8.0000. On the commodity side, production of liquefied petroleum gases (part of industry I-0 8.0000) is reclassified to the commodities of I-0 31.0100, Petroleum refining and miscellaneous products of petroleum and coal.

I-0 9.0000 Stone and clay mining and quarrying

The commodity output of this industry includes dimension stone, crushed and broken limestone, granite, and other stone; sand and gravel; clay, ceramic, and refractory materials; and all of nonmetallic minerals (except fuels) services (SIC 148) other than the construction activity related to new access structures for solid mineral development (I-0 11.0508). One set of commodities is reclassified, as shown in table B of chapter VIII.

I-0 10.0000 Chemical and fertilizer mineral mining

The commodity output of this industry includes barite, fluorspar; potash, soda, and borate minerals; phosphate rock; rock salt; sulfur; and miscellaneous chemical and fertilizer minerals. There are no redefinitions into or out of the industry, but there are several reclassifications, as shown in table B of chapter VIII.

Construction (I-0's 11 and 12)

Construction (including force account construction) is treated as an activity, which means that commodity output is the same as industry output. New construction includes 33 component types and maintenance and repair construction includes 17 types. These are shown in Appendix C--Industry Classification of the 1972 Input-Output Tables.

Industry/
commodity

I-0 11 New construction

Output of new construction is the measure of value put-in-place of private and public original erections, additions, and alterations

2/ Also excluded from output, by redefinition, is the force account drilling activity of crude petroleum and natural gas wells (SIC 1311).

Industry/
commodity

I-0 11 (con.) which increase or alter the stock of buildings or other structural facilities and are charged to capital account. New construction includes force account new construction performed on own account by nonconstruction industries and by government agencies, with their own work force. It also includes the value of materials used in new residential construction performed by households on a do-it-yourself basis.

Equipment that is an integral part of the facility and essential for its general use is included in the value of construction. Some examples are elevators, heating and plumbing equipment, and electrical fixtures. Equipment items that are not structurally part of the facility or are meant for a special rather than general use of the facility are not included in the construction value. For example, excluded from construction are dishwashers, refrigerators, ranges, built-in ovens, and room air conditioners, which are personal consumption expenditures, and fixed conveyor lines in factories and steam tables in restaurants, which are producers' durable equipment.

As indicated, new construction is measured by value put-in-place. Materials, payrolls, profits, overhead, architectural and engineering costs, excavation, and demolition costs directly associated with the construction project are part of the value-put-in-place. This refers to work done during a given time period regardless of the starting and completion date of the entire construction project. For the 1972 study, only work performed during calendar 1972 is included.

Construction covers the value of work of construction contractors (SIC 15, 16, and 17); establishments in SIC 138 performing petroleum and natural gas well drilling; establishments in SIC 1081, 1112, 1213, 138, and 148 performing new petroleum, natural gas, and solid mineral exploration; and establishments in SIC 1081, 1112, 1213, and 148 building new access structures for solid mineral development. Re-defined out of construction (both new and maintenance and repair) are receipts from landscaping, from installation of oil well machinery, from the sale of machinery and equipment, from the sale of construction materials and household appliances not considered as part of the value of put-in-place construction, installation of refrigeration equipment, the real estate activity of operative builders, installation of central switching equipment, and rental of equipment. (See chapter VIII, table A.)

I-0 12

Maintenance and repair construction

Output is defined on an activity basis and includes the upkeep and restoration of existing facilities, the costs of which are charged to current expense. It includes maintenance and repair construction activity performed on force account (by own employees) by nonconstruction industries and government agencies. It includes the value of materials used in residential maintenance and repair performed by households on a do-it-yourself basis.

Industry/
commodity

I-0 12 (con.) By redefinition, it includes receipts of wholesalers for installing and repairing plumbing and heating equipment, receipts of fuel oil dealers (retailers) for oil and gas burner installation and service, receipts of retailers for installing and repairing glass and screens, receipts of repair service establishments for repair of central air conditioning, and receipts of miscellaneous business services for septic tank and furnace cleaning.

Manufacturing (I-0 13-64)

Manufacturing industries are defined essentially on an establishment basis, but there are some modifications. Each industry's output includes the receipts from all production activities, including both primary and secondary products, performed by the establishments classified in the specific SIC or Census of Manufactures industry comprising the I-0 industry. In general, industry outputs are based on the values published in the 1972 *Census of Manufactures*. Modifications are noted below and in the definitions of specific industries or industry groups. Redefinitions and coverage adjustments are summarized, showing the 1972 dollar amounts, in table A of chapter VIII. Reclassifications of commodities are shown in table B. Redefinitions involving manufacturers' resales of unprocessed merchandise, rental receipts of manufacturing industries, and manufacturers' sales of self-generated electric energy are the same as those described for the mining industries.

One of the important deviations from published Census data is the inclusion of manufacturers' excise taxes in the producers' value of commodity shipments. The industries for which these manufacturers' excise taxes are most significant are Food and kindred products, Tobacco manufactures, Petroleum refining and related industries, Rubber and miscellaneous plastics products, Motor Vehicles and equipment, and truck parts (stampings, springs, carburetors, etc.). These industries account for 99.5 percent of the \$12.5 billion of manufacturers' excise taxes in 1972. Food and kindred products accounts for 41 percent by itself.

Industry/
commodity

I-0 13 Ordnance and accessories

Includes I-0 13.0100, Complete guided missiles; 13.0200, Ammunition, except for small arms; 13.0300, Tanks and tank components; 13.0500, Small arms; 13.0600, Small arms ammunition; 13.0700, Other ordnance and accessories. The output is the same as that in the Census of Manufactures, except that manufacturers' excise taxes are added to the output of both fire arms (\$31.6 million) and small arms ammunition (\$15.4 million).

I-0 14 Food and kindred products

Except for a number of redefinitions, reclassifications, and the addition of manufacturers' excise taxes to sugar processing and alcoholic beverages, the industry and commodity outputs are derived directly from the 1972 *Census of Manufactures*. The redefinitions are shown in table A of chapter VIII.

Industry/
commodity

I-0 14 (con.) There are also a number of commodities reclassified to become part of the commodity output of food and kindred products, as shown in table B of chapter VIII.

As noted above, manufacturers' excise taxes are added to food and kindred products commodity output and are fairly substantial for alcoholic beverages, amounting to \$1,132.0 million for malt liquors, \$324.3 million for wines and brandy, and \$3,491.7 million for distilled liquor other than brandy. There was also an excise tax on sugar processing of \$128.0 million.

I-0 15 Tobacco manufactures

Except for a major redefinition and an addition for undercoverage, both affecting I-0 15.0200, Tobacco stemming and redrying, the only difference from the *1972 Census of Manufactures* is the inclusion of manufacturers' excise taxes on cigarettes and cigars. The taxes amounted to \$2,188.3 million on cigarettes and \$43.7 million on cigars.

I-0 16 Broad and narrow fabrics, yarn and thread mills

In this group, comprised of four detailed I-0 industries, there is a major redefinition and a major coverage adjustment affecting I-0 16.0100, Broadwoven fabric mills and fabric finishing plants (see table A in chapter VIII). In addition, there are two commodity reclassifications, as shown in table B of chapter VIII.

I-0 17 Miscellaneous textile goods and floor coverings

There are 10 component I-0 industries in this group. Only one, I-0 17.1002, Textile goods, n.e.c., is affected by redefinition, representing receipts of wholesalers who buy wool, have it combed and converted to tops on contract, and sell at wholesale. There are no changes from the SIC definitions or Census data for the others.

I-0 18 Apparel

There are seven component I-0 industries in this group. Only one, I-0 18.0400, Apparel made from purchased materials, is affected by redefinition, in two ways. First, receipts from I-0 64.1200 for apparel sales from establishments primarily engaged in dressing and dyeing of furs is redefined to I-0 18.0400. Second, receipts for custom tailoring, dressmaking, and fur goods production by retailers is redefined to I-0 18.0400. There are also two reclassifications within I-0 18, as shown in table B of chapter VIII.

Industry/
commodity

I-0 19 Miscellaneous fabricated textile products

Except for the commodity shown in table B of chapter VIII as a secondary product of I-0 18.0203 becoming a primary commodity of I-0 19.0200, there are no changes from the SIC definitions or Census data for the eight component I-0 industries in this group.

I-0 20 Lumber and wood products, except containers

There are 13 component I-0 industries in this group. Only one, I-0 20.0100, Logging camps and logging contractors, shows any change from the SIC definitions or Census data. There are two coverage adjustments, involving first an estimate of conversion of purchased stumpage to logs and bolts shipments and second, a computed value for undercoverage of the Census shipments of logs and bolts.

I-0 21 Wood containers

This group, which has only one component I-0 industry, involves no modification of the SIC definition or Census data.

I-0 22 Household furniture

This group, which has six component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 23 Other furniture and fixtures

This group, which has seven component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 24 Paper and allied products, except containers and boxes

There are 12 component I-0 industries in this group. The output of I-0 24.0706, Converted paper products, n.e.c., has been increased by \$1.0 million to reflect the manufacturers' excise tax on cigarette paper. There is one secondary product adjustment, as shown in table B of chapter VIII.

I-0 25 Paperboard containers and boxes

This group, which has only one component I-0 industry, involves no modification of the SIC definition or Census data.

I-0 26 Printing and publishing

This group has 15 component I-0 industries, covering all of SIC 27. In general, there is very little modification of the SIC definitions or Census data. However, there are eight items which are treated as primary products in the Census but are defined as secondary products in the 1972 I-0. All of these are now identified as primary commodities of I-0 73.0200, Advertising. The items are all identified in table B of chapter VIII.

Industry/
commodity

I-0 27 Chemicals and selected chemical products

This group has 10 component I-0 industries. There is one redefinition, one coverage adjustment, and five commodity reclassifications. The redefinition involves the commodity alumina, which is redefined from I-0 27.0100 to become part of the commodity group of I-0 38.0400. The coverage adjustment is the addition of the computed value for shipments of explosives from government-owned, contractor-operated plants.

I-0 28 Plastics and synthetic materials

This group has four component I-0 industries. There is no modification of the SIC definitions or Census data.

I-0 29 Drugs, cleaning and toilet preparations

This group has five component I-0 industries. There is no modification of the SIC definitions or Census data.

I-0 30 Paints and allied products

This group, which has only has one component I-0 industry, involves no modification of the SIC definition or Census data.

I-0 31 Petroleum refining and related industries

This group has three component I-0 industries with only the first (I-0 31.0100) involving any modifications of Census data. First, excise taxes on gasoline (\$3,787.0 million) and lube oil (\$106.0 million) are added to Census output. Second, as shown in table B of chapter VIII, liquefied refinery gases, aliphatics, etc., are established as secondary products of petroleum and become part of the primary commodities of basic chemicals (I-0 27.0100). Also liquefied petroleum gases, produced in I-0 8.0000 and used for blending, are reclassified to the primary commodities of I-0 31.0100.

I-0 32 Rubber and miscellaneous plastics products

This group has six component I-0 industries, with only the first (I-0 32.0100) involving any modifications of Census data. Excise taxes on tires, inner tubes, and tread rubber (\$758.0 million) are added to Census output.

Industry/
commodity

I-0 33 Leather tanning and finishing

This group, with only one component I-0 industry, involves no modification of the SIC definition or Census data.

I-0 34 Footwear and other leather products

This group, with eight component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 35 Glass and glass products

This group, with two component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 36 Stone and clay products

This group, with 23 component I-0 industries, involves only three modifications of Census data, as shown in table B of chapter VIII.

I-0 37 Primary iron and steel manufacturing

This group, with nine component I-0 industries, involves no redefinitions or coverage adjustments, but there are a number of items which change from Census primary products to I-0 secondary products. Coke oven tar and light oil derivatives are made secondary to I-0 37.0101 and primary to I-0 27.0100, and coke oven ammonia is made primary to I-0 27.0201. As shown in table B of chapter VIII, there are seven other changes which move commodities from iron and steel component commodities to other component commodities, all in the steel group except two.

I-0 38 Primary nonferrous metals manufacturing

This group contains 14 component I-0 industries. There is only one redefinition, alumina produced in I-0 27.0100 and defined to be part of I-0 38.0400. There is one coverage adjustment, an addition of \$461.3 million to I-0 38.0100, Primary copper, to account for Census undercoverage of primary copper refined on contract (toll processed). As shown in table B of chapter VIII, there are ten changes which move commodities from component industries of I-0 38 to other commodities or from other commodities to I-0 38.

I-0 39 Metal containers

This group, with two component I-0 industries, involves no modification of the SIC definitions or Census data.

Industry/
commodity

- I-0 40 Heating, plumbing, and fabricated structural metal products
- This group, with ten component I-0 industries, involves no modifications except that output excludes construction-type installation, which is defined as part of I-0 11.
- I-0 41 Screw machine products and stampings
- This group, with four component I-0 industries, involves no modifications except that for stampings of truck parts, for which there is a manufacturers' excise tax of \$8.2 million. This is added to the Census output for I-0 41.0201.
- I-0 42 Other fabricated metal products
- This group has 11 component I-0 industries. Steel springs for trucks, produced by I-0 42.0700, have a manufacturers' excise tax of \$1.1 million, which is added to the Census output. In addition, there are two commodity reclassifications which become primary products of I-0 42.0500, Miscellaneous fabricated wire products.
- I-0 43 Engines and turbines
- This group has two component I-0 industries. There are no modifications except for a manufacturers' excise tax of \$7.4 million for internal combustion engines and parts used in trucks. The affected commodity is I-0 43.0200, Internal combustion engines, n.e.c., which is increased by the listed amount above Census output.
- I-0 44 Farm and garden machinery
- This group, with two component I-0 industries, involves no modifications of the SIC definitions or Census data.
- I-0 46 Materials handling machinery and equipment
- This group, with four component I-0 industries, involves no modifications except that output excludes construction-type installation, which is defined as part of I-0 11.
- I-0 47 Metalworking machinery and equipment
- This group, with six component I-0 industries, involves no modification of the SIC definitions or Census data.
- I-0 48 Special industry machinery equipment
- This group, with six component I-0 industries, involves no modification of the SIC definitions or Census data.

Industry/
commodity

I-0 49 General industrial machinery and equipment

This group, with seven component I-0 industries, involves no modifications except that output excludes construction-type installation, which is defined as part of I-0 11.

I-0 50 Miscellaneous machinery, except electrical

This group, with two component I-0 industries, involves an excise tax and a redefinition for I-0 50.0001, Carburetors, pistons, rings, valves. The excise tax added to Census output is \$1.0 million for truck parts. The redefinition is the addition of receipts for rebuilt carburetors produced in wholesale trade (I-0 69.0100).

I-0 51 Office, computing, and accounting machines

This group, with five component I-0 industries, involves no modifications other than a coverage adjustment for I-0 51.0101, Electronic computing equipment. This adjustment is a subtraction of \$433.5 million representing revaluation of computers purchased by a subsidiary or used by the manufacturer in a leasing operation from a "commercial" or "market" value to a cost basis.

I-0 52 Service industry machines

This group, with five component I-0 industries, involves no modifications except that output excludes construction-type installation, which is defined as part of I-0 11.

I-0 53 Electric transmission and distribution equipment and
industrial apparatus

This group, with eight component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 54 Household appliances

This group, with seven component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 55 Electric lighting and wiring equipment

This group, with three component I-0 industries, involves no modification of the SIC definitions or Census data.

Industry/
commodity

I-0 56 Radio, TV, and communication equipment

This group, with four component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 57 Electronic components and accessories

This group, with three component SIC industries, involves no modification of the SIC definitions or Census data.

I-0 58 Miscellaneous electrical machinery and supplies

This group, with five component SIC industries, involves no modifications other than an excise tax of \$1.0 million for truck batteries (I-0 58.0100), an excise tax of \$2.1 million for engine electrical equipment used in trucks (I-0 58.0400), and a commodity reclassification for I-0 58.0500, which changes appliance wire and cord, etc., to a secondary product of I-0 58.0500 and a primary product of I-0 38.1000.

I-0 59 Motor vehicles and equipment

This group, with four component SIC industries, has a number of modifications. The following manufacturers' excise taxes were added to Census output: (1) \$92.1 million for truck and bus bodies (I-0 59.0100); (2) \$98.7 million for truck trailers (I-0 59.0200); (3) \$177.2 million for complete trucks and buses (I-0 59.0301); and (4) \$83.2 million for other motor vehicle parts and accessories used in producing trucks (I-0 59.0302). There was one redefinition in the group; receipts for rebuilt motor vehicle parts (excluding carburetors) produced in wholesale trade (I-0 69.0100) have been redefined as part of the output of Motor vehicle parts and accessories (I-0 59.0302). There was also one commodity reclassification in this group. Complete vehicles (except passenger cars and motor homes) produced from purchased chassis became secondary products of I-0 59.0100 and primary commodities of I-0 59.0301.

I-0 60 Aircraft and parts

This group, with three component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 61 Other transportation equipment

This group, with seven component I-0 industries, has three redefinitions and one coverage adjustment, as shown in table A of chapter VIII.

Industry/
commodity

I-0 62 Professional, scientific, and controlling instruments
and supplies

This group, with seven component I-0 industries, involves one modification of the SIC definitions or Census data; the output excludes construction-type installation, redefined as part of I-0 11.

I-0 63 Optical, ophthalmic, and photographic equipment and supplies

This group, with three component I-0 industries, involves no modification of the SIC definitions or Census data.

I-0 64 Miscellaneous manufacturing

This group, with 20 component I-0 industries, has two redefinitions, one commodity reclassification, and one addition to output of manufacturers' excise tax. The excise tax addition, amounting to \$15.0 million, is for fishing tackle and equipment, produced by I-0 64.0400, Sporting and athletic goods, n.e.c. The other modifications are shown in tables A and B of chapter VIII.

Transportation and warehousing (I-0 65)

The output of this industry group includes receipts for transportation, warehousing, and allied services by all private establishments in SIC major groups 40-42 and 44-47.

Because of adherence to the establishment concept, for-hire transportation and warehousing activities performed by mining, manufacturing, and trading companies are included in the transportation total and excluded from the output of these other industries. Thus, for example, the pipeline departments of petroleum companies and the operation of private water carriers are covered in the industry. On the other hand, coal produced in mines owned by railway companies and the value of equipment built in railway repair shops are excluded from the transportation industry. Transportation services self-performed and self-consumed, e.g., private trucking and warehousing, business flying, and the cost of business use of passenger cars, are not included in the industry output total.

While the measure of output for this industry is generally in terms of revenues from transportation and warehousing operations, the value of output of the industry also includes tips received by employees, the value of scrap generated in the industry, and revenues from some secondary activities. It does not include subsidies paid by the government to offset operating deficits.

The principal revenues from secondary activities of the transportation industry are rental receipts and gross margins from the sale of merchandise. These are redefined to other industries in the 1972 I-0 system.

The commodity totals for transportation include the transportation revenues from government enterprises. The revenues from government enterprises are those derived from the operation of transit systems, air terminal facilities, and port facilities.

Scrap generated in transportation activities, largely from the railroad activity, is part of transportation industry output, but it becomes part of the scrap, used, and secondhand goods commodity.

Industry/
commodity

I-0 65 Transportation and warehousing

This group, with seven component I-0 industries, has a number of redefinitions affecting four transportation modes and two excise taxes added to the output of air transportation. The redefinitions are detailed in table A of chapter VIII. The excise taxes added to Air transportation in 1972 amounted to \$642.0 million for passenger transportation and \$32.0 million for air freight.

Communications and utilities (I-0 66, 67, 68)

The telephone and telegraph industry (I-0 69.0000) includes in its output Federal excise taxes and State and local excise and sales taxes. Receipts from telephone directory advertising are part of industry output, but as a commodity they become part of advertising.

The radio and TV broadcasting industry has as its predominant output receipts from the sale of time and talent. However, as a commodity these receipts become part of advertising, leaving only a very small fraction of industry output as the remaining commodity output.

The utility industries--electric, gas, water, and sanitary services--include in industry output all revenues of privately-owned establishments classified in SIC 49. Production which is produced and consumed in the same plant is excluded from industry output, but sales of electricity and gas by one utility plant to another are included at full value. Sales taxes on electricity and gas are added to reported revenues in deriving industry output. Sales of excess electricity produced in manufacturing, mining, and railroads are redefined into the output of electric utilities. The output of government enterprises in the utility area (e.g., I-0 78.0200, Federal electric utilities, and I-0 79.0200, State and local electric utilities) is added to commodity output of the private utilities. Thus, there is no commodity output for these two government enterprises. Similarly, there is a substantial reduction in the commodity output of I-0 79.0300, Other State and local government enterprises. Public sewer and sewage facilities are excluded from the commodity reclassifications of government enterprises, but water facilities are included with the primary commodity output of I-0 68.0300.

Industry/
commodity

I-0 66 Communications, except radio and TV

This group, consisting of one I-0 industry, has one redefinition, one reclassification, and one excise tax addition. Installation of central switching equipment was redefined from construction. In addition, there was an imputation for force account installation of central switching equipment amounting to \$1,467.0 million. Receipts for telephone directory advertising, amounting to \$901.2 million in 1972, became a secondary product of I-0 66.0000 and a primary commodity of I-0 73.0200, Advertising. The Federal excise tax on telephone and telegraph, amounting to \$1,835.0 million, is added to the output of I-0 66.0000. Also, State and local excise and sales taxes of \$375.7 million are added to output.

I-0 67 Radio and TV broadcasting

There is only one I-0 industry in this group. There are no redefinitions, but almost all of the industry output is reclassified as secondary to I-0 67.0000 and primary to I-0 73.0200, represented by \$4,449.6 million in commercial time sales. In addition, \$59.3 million of talent performance by radio and TV performers is made secondary to I-0 67.0000 and primary to I-0 76.0200, Amusement and recreation services.

I-0 68 Electric, gas, water, and sanitary services

There are three I-0 industries in this utility group. The major redefinition affecting them is that referred to earlier on electricity produced and sold by manufacturing, mining, and railroads. This is added to the output of the electricity produced by I-0 68.0100. The commodity electricity is further augmented by the electricity produced by government enterprises, as mentioned above. Similarly, the commodity natural gas (I-0 68.0200) and the commodity water (I-0 68.0300) are augmented by the amounts produced by government enterprises. There is one other commodity reclassification, represented by coke oven gas being made secondary to I-0 37.0101 and primary to I-0 68.0200. Also, as mentioned above, sales taxes on electricity and gas are added to reported output for the two industries.

Wholesale and retail trade (I-0 69)

The two trade industries are handled very much like activities in that secondary products have been redefined out of them and primary products have been redefined into them. There are a few commodity additions to retail trade (mostly from government enterprises) and one commodity addition to wholesale trade (from warehousing). Eating and drinking places has been taken out of retail trade and now exists as a separate industry (I-0 74.0000).

The major receipts of trade are gross margins (equal to operating expenses plus profits) from the reselling activities of wholesale and retail trade establishments. In addition, the output of trade includes the commissions of merchandise agents and brokers, customs revenues from import duties (which are added to the output of wholesale trade), State and local general sales taxes (which are added to retail trade), Federal excise taxes collected and remitted at the trade level, and various other wholesale and retail taxes (such as wholesale and retail gasoline taxes and similar taxes on tobacco, liquor, diesel fuel, and aviation fuel).

The output of trade excludes the gross margins of manufacturers' sales offices, on the assumption that these margins are covered by the value of manufacturers' shipments reported in the Census of Manufactures.

By redefinition, the receipts of trade establishments from service and manufacturing activities are excluded from the output of trade. On the other hand, the gross margins on sales of merchandise by establishments classified in the service industries are redefined into trade. Also, the margin on resales by manufacturing and mining establishments of products which have not been processed are added to the output of wholesale trade.

Industry/
commodity

I-O 69.0100 Wholesale trade

Other than the major redefinition which moved into wholesale trade all sales at wholesale of goods purchased for resale without further processing by manufacturing and mining industries, there are 19 redefinitions affecting wholesale trade. Of these, 16 are subtractions and three are additions, as shown in table A of chapter VIII. The following taxes become additions to the output of wholesale trade:

	<u>Millions of dollars</u>
Custom duties -----	2,995.0
State and local liquor taxes -----	1,749.0
State and local tobacco taxes -----	2,965.0
State and local gasoline taxes -----	<u>7,578.0</u>
Wholesale total -----	15,287.0

I-O 69.0200 Retail trade

As shown in table A of chapter VIII, there are 27 redefinitions affecting the output of retail trade. Thirteen are subtractions and 14 are additions. The following taxes become additions to the output of retail trade:

	Millions of dollars
General sales taxes -----	16,486.5*
Alcohol retailers -----	18.0
State and local liquor taxes -----	73.0
State and local tobacco taxes -----	162.0
State and local gasoline taxes -----	61.0
Diesel and aviation fuel taxes -----	364.0
Retail total -----	17,164.5*

*Excludes \$1,812.5 million of sales taxes applicable to sales of eating and drinking places

Finance, insurance, and real estate (I-O 70, 71)

Finance and insurance

The output of the financial intermediaries includes the value of services for which monetary income is received, plus imputed values for services furnished without explicit charge.

For commercial banks and regulated investment companies, the imputed service charge to business and households is equal to an imputation of interest paid. This imputed interest expense is derived by deducting monetary interest paid from dividends and monetary interest received.

A similar imputation procedure is followed for mutual savings banks, Federal Reserve Banks, savings and loan associations, and credit unions. However, in the case of these institutions, imputed interest paid is derived by deducting profits, in addition to dividends and monetary interest paid, from dividends and monetary interest received.

The output of life insurance carriers is measured by expenses. The expenses include an imputation for interest paid, which is derived in the same way as that for mutual savings banks. Life insurance output is adjusted to exclude expenses incurred by U.S. companies in connection with insurance carried by foreign consumers. Expenses of private pension funds which are self-administered are added to the life insurance output.

Nonlife insurance output is measured on a net basis, that is, premiums earned less benefits paid. For accident and health insurance held by both life and nonlife carriers, net premiums earned are adjusted to exclude direct transactions with foreigners.

The output of insurance agents and brokers, combinations of real estate, insurance, loan, and law offices, and holding companies is measured by total income. The output of security and commodity brokers is augmented to include net capital gain from sales of securities for their own account. The output of security and commodity brokers includes taxes on securities. The output of personal and business credit agencies is measured as receipts other than business and interest receipts, since their business receipts are treated as monetary interest received.

The output of Agricultural Credit Institutions is measured by their loan service fees, compensation for services under CCC programs, and income from the Federal Land Banks. Federal Land Banks, Federal Home Loan Banks, the Board of Governors of the Federal Reserve System, and self-administered private pension funds are included in this industry.

Commodity output for I-0 70 includes similar items from State and local government enterprises (I-0 79.0300).

The only secondary products of I-0 70, as shown in table 2B of *Volume I: The Use and Make of Commodities by Industries, 1972*, are products of miscellaneous business services (I-0 73.0100), miscellaneous professional services (I-0 73.0300), and real estate (I-0 71.0200). Similar, but more aggregate information appears in table 2 of the April 1979 article in the *Survey*.

Real estate and rental

The output total for this industry group covers (1) all rents paid on real property, whether paid to business, government, or persons; (2) total royalty payments; (3) the imputed rental value of owner-occupied farm and nonfarm dwellings; (4) an imputed rental payment by nonprofit institutions serving individuals; (5) receipts of real estate firms for property management; and (6) receipts of real estate firms resulting from the transfer of real property, including taxes on deeds of conveyance.

Rent and royalty receipts of other industries (other than real estate firms) are redefined into I-0 71.0200, Real estate.

The addition of government receipts of rents and royalties to the output of industry 71 is balanced by a nontax payment to government. Government rents and royalties are treated as a nontax receipt, rather than as a government sale, since these receipts are closer to net than to gross rents. Such treatment results in minimum distortion of aggregate GNP.

The imputed rental value of owner-occupied nonfarm homes is included in the output of I-0 71.0100 and the various expenses of home ownership (maintenance, taxes, interest, depreciation) together with the residual, net rental income, are shown as inputs into this industry. (The costs of household operations, including utilities and heating, are consumer expenditures and not part of this industry.) Similarly, nonprofit institutions serving individuals are treated as making imputed rental payments to I-0 71. This imputation is equal to their interest and depreciation expenses. This addition to output of I-0 71 is balanced by additions to its interest and depreciation expenses. The imputation for farm operator dwelling rent is also part of the primary output of this industry.

Since trading in real property is the main function of real estate developers, their net gains from sales of real property are included in the output and profit measures for this industry, although, in general, capital gains are excluded from national account measurements.

The real estate activity of operative builders (SIC 1531), amounting to \$1,633.7 million in 1972, is redefined from construction to I-0 71.0200. In 1972, there was no specific subtraction of output from construction, since the development of output totals for I-0 construction activity excluded the real estate operations of operative builders. Conceptually, however, the SIC definition of construction establishment output would include these receipts.

Industry/
commodity

I-0 70

Finance and insurance

This group, with five component I-0 industries, had no redefinitions and no commodity reclassifications. There are, however, two tax items which affected the output of I-0 70.0300, Security and commodity brokers. The first, amounting to \$503.0 million in 1972, is the New York State stock transfer tax. The second, amounting to \$81.0 million, is an interest equalization tax.

I-0 71

Real estate and rental

This group has two component I-0 industries. The first, I-0 71.0100, Owner-occupied dwellings, is an activity with no secondary products and none of its primary products is produced elsewhere. There are no redefinitions or reclassifications or excise taxes. The value of output in the I-0 tables is that estimated in the national income and product accounts as imputed rent, or space rent. The concept refers to both farm and nonfarm dwellings and is part of personal consumption expenditures.

The second component, I-0 71.0200, Real estate, has two specific redefinitions, as shown in table A of chapter VIII. Also, room receipts from permanent guests of hotels and lodging places (I-0 72.0100) are made secondary to that industry and reclassified to real estate.

Services (I-0 72-77)

This group is very diverse, extending from hotels and lodging places to business services, to amusements, eating and drinking places, automobile repair, health services, etc. There is no advantage in generalizing the discussion of these as a group, because each one is essentially different, with very little in common as to industry description or redefinition. Hence, each two-digit I-0 will be discussed in turn.

Industry/
commodity

I-0 72

Hotels and lodging places; personal and repair services (except auto)

There are three component I-0 industries in this group. For each, the value of output includes all taxes collected directly from the customer and remitted to the tax authority. These are essentially special taxes, somewhat different from general sales taxes.

There are a number of redefinitions affecting each of the component I-0 industries, as shown in table A of chapter VIII.

There is one commodity reclassification in this group. Room receipts from permanent guests of hotels and motels has been made secondary to I-0 72.0100 and becomes a primary product of I-0 71.0200, Real estate.

Industry/
commodity

I-0 73

Business services

The I-0 component industries of this group are miscellaneous business services (73.0100), advertising (73.0200), and miscellaneous professional services (73.0300). Most of the services in this group are defined on an activity basis, using the redefinition approach to achieve homogeneity. The advertising component includes in its output talent and production costs paid for directly by advertisers, along with all the activities covered by SIC 731. Advertising as a commodity has been augmented substantially by reclassifications of the advertising activities of a number of other industries to become primary products of I-0 73.0200.

Redefinitions affecting I-0 73.0100 are shown in table A of chapter VIII.

There are no redefinitions affecting advertising, but there are four affecting miscellaneous professional services, as shown in table A of chapter VIII.

Commodity reclassifications mostly affect I-0 73.0200. In addition to eight items which became primary to advertising coming from printing and publishing, there are six others, as shown in table B of chapter VIII.

I-0 74

Eating and drinking places

Eating and drinking places (I-0 74.0000) is the only I-0 component of the category. This is a new industry in the 1972 I-0 table. Previously, it was included with retail trade. Output of eating and drinking places includes general sales taxes and tips to employees. The sales taxes amounted to \$1,812.5 million in 1972.

This industry has no secondary product and only one other industry produces any of the primary commodity. That industry, I-0 78.0400, Other Federal Government enterprises, produced \$171.7 million of the commodity or 0.3 percent of the total, all at overseas facilities of the Federal Government (both defense and nondefense). There were ten redefinitions into and two out of eating and drinking places, as shown in table A of chapter VIII.

I-0 75.0000

Automobile repair and services

The industry was modified somewhat from the SIC basis. The value of output includes all taxes on auto repairs and services collected directly from the customer and remitted to the tax authority. Also included are regular car rental services, but rental of an automobile or limousine with a driver is included in I-0 65.0200 (in the component which includes the services of taxicab drivers). The several redefinitions affecting this industry are shown in table A of chapter VIII.

Industry/
commodity

I-0 76.0000 Amusements

The two detailed component industries are I-0 76.0100, Motion pictures, and I-0 76.0200, Amusement and recreation services. For both industries, the output includes the value of amusement services wherever produced and the output includes Federal, State and local admissions taxes. There are a number of redefinitions and classifications, as shown in tables A and B of chapter VIII.

I-0 77 Health, educational, and social services and nonprofit organizations

This industry group, with nine component I-0 industries, is defined essentially on a commodity (or activity) basis and includes the total value of the covered services wherever they occur in the private economy. There are four redefinitions and one reclassification, as shown in tables A and B of chapter VIII.

Government enterprises (I-0 78, 79)

As stated in the main text of this report (page 45), the current account activities of both Federal Government and State and local government enterprises are included as intermediate industries in the I-0 tables. The capital account purchases of enterprises are included with the appropriate general government activity. For both Federal and State and local enterprises, at least 50 percent of costs must be covered by sales of goods and services, and for Federal enterprises, sales must be at least \$10.0 million per year, and most of the capital stock (if there is any) must be held by a government corporation or agency. In the I-0 classification system for 1972, Federal Government enterprises include the Postal Service, Federal electric utilities, the Commodity Credit Corporation, and all other. The specific enterprises included in each are shown below in the discussion of I-0 78.0000. State and local government enterprises include government passenger transit, State and local electric utilities, and all other. No breakdown is shown of the hundreds of specific enterprises existing at the State and local level.

As discussed earlier, in cases where the commodity output of a government enterprise is identical with a private industry commodity, the enterprise commodity is added to the private commodity and distributed along the same row of the I-0 Use table, except in those cases where the public commodity accounts for the largest portion of total commodity output.

Industry/
commodity

I-0 78 Federal Government enterprises

There are four component I-0 industries in this group. The first, I-0 78.0100, U.S. Postal Service, is identified in the SIC at the four-digit level and has no subcomponent enterprises. The second is I-0 78.0200, Federal electric utilities, which includes the Bonneville Power Administration, the Southeastern Power Administration, the Tennessee Valley Authority, and the Upper Colorado River Storage Project. All of the output of I-0 78.0200 is considered to be the

Industry/
commodity

I-O 78 (con.) same commodity as that of I-O 68.0100 and is correspondingly excluded from commodity output of I-O 78.0200 and added to commodity output of I-O 68.0100. The third component is I-O 78.0300, Commodity Credit Corporation, which exists as an industry, but since it has zero output there is no associated commodity.

The fourth component is I-O 78.0400, Other Federal Government enterprises, which consists of a fairly large number of items, but much smaller than in earlier years because some 26 operations previously classified as Federal enterprises did not meet the \$10.0 million annual sales requirement. The list of included enterprises is subdivided by type--i.e., trade group, transportation group, finance-banking group (with no detail), and insurance-regulatory group. Two of the trade groups are partly redefined to exclude their eating and drinking activities and to become part of I-O 74.0000.

Trade group

- Army-Air Force Civilian Post Restaurants (partly redefined)
- Army-Air Force Motion Picture Service
- Army-Air Force Post Exchanges
- Marine Corps Post Exchanges
- Naval Exchanges and Naval Ships Stores
- Officers' and Enlisted Men's Clubs (partly redefined)
- Government Printing Office Sales Distribution Operation
- Canteen Service Revolving Fund, Veterans Administration
(redefined entirely to I-O 74.0000)

Transportation group

- Alaska Railroad
- Panama Canal Company
- National Capital Airports, Federal Aviation Administration

Finance - Banking group (no detail available)

Insurance - Regulatory group

- Federal Deposit Insurance Corporation
- Federal Housing Administration Fund
- Federal Savings and Loan Insurance Corporation
- Federal Home Loan Bank Board Revolving Fund
- Overseas Private Investment Corporation
- Credit Union Share Insurance Fund
- Pension Benefit Guaranty Corporation

Note that the VA Canteen Service Revolving Fund is completely redefined out of Federal enterprises and appears only as part of I-O 74.0000.

Industry/
commodity

I-0 78 (con.) Among the excluded enterprises are Alaska Power Administration, Colorado River Basin Project, Export-Import Bank, St. Lawrence Seaway, and War Risk Insurance Revolving Fund.

I-0 79 State and local government enterprises

This industry group covers the activities of the State and local government agencies, with separate accounting records, that cover over half of their current operating costs by the sale of goods and services to the general public. State and local government enterprises include (1) gas and electric utilities, (2) water supply facilities, (3) transit facilities, (4) liquor stores, (5) water transportation and terminals, (6) air transportation facilities, (7) highway toll facilities, and such activities as (8) sewers and sewage disposal, (9) low-cost housing and urban renewal, and (10) some miscellaneous activities such as off-street parking and city markets. The commodity outputs of most State and local government enterprises are made primary to private industries in which the comparable commodity is produced. Thus, there is no commodity output for I-0 79.0100, Local government passenger transit, nor for I-0 79.0200, State and local electric utilities. Also, the commodity output for I-0 79.0300, Other State and local government enterprises, is substantially less than industry output because of the inclusion in the industry of gas utilities, liquor stores, air transportation facilities, off-street parking, etc.

Special industries and commodities (I-0 80-85)

In earlier I-0 studies, there were three "dummy" industries, two industries representing imports, and four special industries. The three dummy industries were "business travel, entertainment, and gifts," "office supplies," and "scrap, used, and second-hand goods." Imports appeared as two rows in the transactions table, one referring to "directly allocated" imports and the other to "transferred" imports. The special industries were "government industry," "rest of the world industry," "household industry," and "inventory valuation adjustment." The special industries were established mostly for providing summary data for key sectors in the economy that accorded with similar sector definitions in the NIPA's.

In the 1972 I-0 table, the dummy industries were eliminated. However, scrap, used, and secondhand goods (I-0 81.0000) is kept as a commodity. The component commodities are produced by various industries and the amounts are shown in the Make table (table 2). The components are also consumed by various industries (and final demand) and the amounts are shown in row 81.0000 of the Use table (table 1).

What used to be called "transferred" imports are now called "comparable" imports (with the definition expanded to include almost all imports going to final demand users). These imports are no longer a row in the transactions table; they appear in final demand as a column (I-0 95.0000) of negatives. As explained in the main text

of this report, these comparable imports are also commodities and are added to the supply of the comparable domestic commodity for distribution to users. Noncomparable imports appear in row 80.0000 of the Use table and they also should be thought of as commodities; they represent, of course, the use by domestic industries of these imports. Several noncomparable imports are sold directly to final demand.

The special industries have also been explained in detail in the main text of this report (beginning on page 28) and need not be repeated. These industries are identical with the commodities that they represent and appear in both the Use and Make tables with the same output totals.

Appendix B

Methods and Sources for the 1972 I-O Use Table

The following discussion is concerned mostly with describing how output controls for each industry and each commodity were developed and with listing the basic source materials used in the study. There will be only limited discussion of methods for deriving inputs to each industry and distributions of output for each commodity, because the entire study involved use of a host of interdependent estimates and sources and continued revision of estimates after firming up estimates for other interrelated industries.

The development of the table of interindustry transactions for 1972 involved bringing together a wide assortment of both precise data and approximations and the evaluation and modification of these estimates to make them consistent with each other and with established control totals for purchases, output, and value added. As a consequence, the initial assembly of independently estimated values of individual purchases by each industry and sales of commodities to each industry and final demand component was subjected to the strict matrix discipline of accounting simultaneously for all of the supply and all of the consumption of each industry's products. This process of estimating, review, analysis, and cross-checking for consistency often resulted in adjustments to the original estimates and sometimes further changes of the adjusted estimates. It is believed that these series of adjustments added significantly to the reliability and usefulness of the final data.

In broad outline, the transactions in the Use table were estimated essentially as follows:

- (1) For each of the 496 industries, control totals were established for industry output, including both primary and secondary production, and subtotals estimated for intermediate purchases of goods and services and value added. The latter was determined initially as a residual for each industry. Later on, as the material and service inputs became more firm, the value added estimates, which were still residuals in large part, became closer to the final figures. At later stages, value added estimates were prepared independently from various sources and then compared with the residuals, which were often modified to be closer to the more summary estimates of the gross product by industry series.
- (2) Estimates were prepared for each commodity of the distribution of output to each industry and to final demand components. For each of the commodities which were products (rather than services), the distribution to users was by major product group (at the five-digit Census product level) or even finer (up to seven-digit). The portions which could not be allocated in detail were distributed as part of total commodity output (i.e., at the six-digit I-O level) without further product specification. In general, most of the services (also called commodities in the 1972 I-O system) were handled similarly, but usually with less output differentiation. Estimates were also prepared of individual commodity inputs to each industry, covering both goods and

services. Since the inputs to industries of commodities and the output distribution of commodities to industries (and final demand) were developed independently in the initial stages, many transactions in the Use table were represented by two estimates--one calculated in the course of accounting for the sales to a given industry and the other in accounting for the purchases by that same industry. The value of sales was typically in producers' prices and the value of purchases was usually in purchasers' prices. These alternate values necessitated the development of a procedure for moving from one estimate to another. Consequently, the necessary information has been developed to permit the 1972 estimates to be expressed in either valuation.

- (3) Trade and transportation margins were first estimated in the aggregate, then classified by product, and then allocated among purchasing industries and final demand. To the extent possible, margins for each transportation mode and for wholesale and retail trade were estimated for each product category. The next step was to distribute the margin amounts applicable to the sale of a given product to a given user. In general, the margins were assigned proportionately to each user on the basis of the value of the purchase. This information was also used to express all the sales and purchases data in both producers' and purchasers' prices.
- (4) The independent (input and output) estimates prepared for each transaction were compared. Where they differed, the more reliable of the two measures was selected or a new estimate developed. In addition, the remaining unidentified (and unallocated) inputs or outputs were distributed and at the last stage total final demand was balanced with total value added. Prior to the final balancing of inputs and outputs, there were many revisions and new estimates which further required comparison of the transactions values as inputs and as outputs. In the final stages, it was often necessary to force balancing by somewhat arbitrary proration or similar procedures, but the values so determined were usually very small in absolute value or as a proportion of total inputs to an industry.

The control totals and subtotals were estimated in accordance with the definitions of each industry. (See appendix A.) The I-O definitions were based primarily on the *SIC Manual* (1972 edition), which was followed almost exactly by the Bureau of the Census in collecting data for the 1972 economic censuses. The relation of I-O industry/commodity definitions to the SIC is shown in the classification list in appendix C and the modifications for I-O purposes are described in chapter VIII of the main text.

The initial estimates of the distribution of output and the composition of input were based largely on information from the economic censuses, but they drew heavily also from reports of other government agencies, trade association data, engineering specification, and so on. In many instances, these sources provided measures of sales to, or detailed purchases by, specific industries. Oftentimes, some of these sources supplied indirect information from which estimates of sales or purchases could be inferred with confidence.

Having completed the measurement of the value of the interindustry transactions and the control totals for output, estimates of the value added by each industry were calculated by subtracting the value of intermediate purchases from the output total. These value added figures were compared with independently derived value added totals calculated as the sum of the factor and nonfactor payments. Adjustments were made, based on this comparison, to the value added data or to the interindustry transactions, to assure consistency among the related but independently developed totals.

The following discussion of sources and methods for deriving control totals, inputs, and outputs is a brief summary, by 85-order categories for the most part. The reader must understand that the entire I-O study was an interrelated analysis. Estimates for one industry or commodity depend upon many estimates for other industries or commodities. Changes were made as the study progressed and these changes often affected a substantial number of related industries. Thus, the reader could not possibly reconstruct the 1972 I-O table merely from the information provided for each industry group in the following discussion. Furthermore, since the study was conducted at the 496-industry level, and with even much more product detail, it would be impossible to use these brief notes to replicate the entire study for 1972. The details in the following pages serve the purpose of providing the reader with an overview of how the study was put together.

The basic data sources were many and varied. The following list of major sources excludes unpublished information obtained from industry and from various experts in the Federal Government and elsewhere. Also excluded are publications which provided only limited data or were applicable only to a few minor estimates. The source list is provided prior to the discussion of the development of industry and commodity estimates, in order to give the reader an idea of the scope of the research and the interrelationship among various sources.

Primary Data Sources

I. Bureau of the Census publications

1972 Census of Mineral Industries

1972 Census of Manufactures

1972 Census of Business

a. Census of Wholesale Trade

b. Census of Retail Trade

c. Census of Selected Services

d. "Nonregulated Motor Carriers and Public Warehousing," part of Census of Selected Services

1972 Census of Transportation

a. National Travel Survey

b. Truck Inventory and Use Survey

c. Commodity Transportation Survey

1972 Census of Construction Industries

1972 Census of Governments

Annual Survey of Manufactures

1972 Current Industrial Reports (annual reports for a large number of industries)

1970 Census of Population and Housing

1969 Census of Agriculture

1972 U.S. Imports TSUSA Commodity and Country, FT 246-72
1972 U.S. Exports, FT 610
1973 Statistical Abstract
Construction Statistics, 1972 and 1973
Annual Sales, Purchases, and Year-End Inventories, Retail Trade

II. U.S. Department of Agriculture publications

Agricultural Statistics, 1972 and 1973
Crop production reports, Crop Reporting Board
Livestock reports, Crop Reporting Board
Poultry and egg reports, Crop Reporting Board
Milk and dairy products reports, Crop Reporting Board
Agricultural price reports, Crop Reporting Board
Other reports of the Crop Reporting Board
Situation reports, Economic, Statistics, and Cooperatives Service
Other reports of ESCS
Agricultural Marketing Service reports
Survey of Farmers' Expenditures, 1971
Other farm expenditure surveys

III. U.S. Department of Commerce (other than Census) publications

National Income and Product Accounts of the U.S., BEA
Balance of Payments articles, BEA
Fishery Statistics of the U.S., 1972, National Marine Fisheries Service
Construction Review, 1972, Bureau of Industrial Economics
U.S. Industrial Outlook (annual), BIE
Other publications of Office of Business Research and Analysis (now part of BIE)
Annual reports of the Maritime Administration

IV. U.S. Department of Defense publications

Waterborne Commerce of the U.S., Corps of Engineers
Special studies of awards to prime contractors

V. Executive Office publications

The U.S. Budget, fiscal 1972 and 1973
Economic Report of the President, 1972

VI. U.S. Department of Health, Education, and Welfare publications

Digest of Educational Statistics (annual), National Center for Educational Statistics
Other publications of Office of Education
Current periodicals of the Social Security Administration, especially *Social Security Review*
Medicare reports of the Social Security Administration

Other reports of the Office of Research and Statistics of the Social Security Administration
Various reports of the Health Resources Administration, the Health Services Administration, and the Health Care Financing Administration

VII. U.S. Department of Interior publications

U.S. Fish and Wildlife Service reports
Minerals Yearbook (annual), Bureau of Mines
Mineral Facts and Problems, 1972 and 1973, Bureau of Mines
Mineral industry surveys, Bureau of Mines
Other Bureau of Mines publications
Bureau of Reclamation publications
Bonneville Power Administration annual reports
Southeastern Power Administration annual reports
Water and Land Resource Accomplishments, 1972, Bureau of Reclamation

VIII. U.S. Department of Labor publications

Manpower Report of the President (annual)
Monthly Labor Review, Bureau of Labor Statistics
Employment and Earnings (monthly), BLS
Handbook of Labor Statistics, BLS
Wholesale and retail price index reports, BLS
Productivity reports, BLS
Consumer Expenditure Survey, 1972-73

IX. U.S. Department of Transportation publications

Statistical Handbook of Aviation, Federal Aviation Administration
Highway Statistics, Federal Highway Administration
Annual reports of the Federal Railroad Administration
An Analysis of Taxicab Operating Characteristics, prepared for Urban Mass Transit Administration by the International Taxicab Association

X. U.S. Department of Treasury publications

Combined Statement of Receipts, Expenditures, and Balances
Reports of Bureau of Alcohol, Tobacco, and Firearms
Treasury Bulletin (monthly)
Statistics of Income (annual), Internal Revenue Service

XI. Interstate Commerce Commission publications

Transport Economics (monthly)
Transport Statistics in the United States, 1972
Various special reports of the ICC
Railway Express Agency data in *Transport Statistics*, 1972

- XII. U.S. Federal Communications Commission publications
- Statistics of Communications Common Carriers* (annual)
 - Special reports on radio and TV broadcasting
- XIII. U.S. International Trade (formerly Tariff) Commission publications
- Synthetic Organic Chemicals, U.S. Production and Sales*
 - Various special studies on tariffs and commodity impacts
- XIV. U.S. Federal Power Commission (now Federal Energy Regulatory Commission) publications
- Statistics of Privately-Owned Electric Utilities* (annual)
 - Statistics of Publicly-Owned Electric Utilities* (annual)
 - Natural gas production and price data
 - Reports on revenues from steam generation
- XV. U.S. Federal Reserve Board publications
- Federal Reserve Bulletin*
 - Industrial Production Indexes*
- XVI. U.S. Civil Aeronautics Board
- Handbook of Airline Statistics*
- XVII. Principal private publications
- Gas Facts*, American Gas Association (annual)
 - Life Insurance Fact Book* (annual)
 - Spectator Yearbook*
 - Best's Aggregates and Averages*
 - Directory of Mutual Companies in the U.S.*
 - Nonlife Insurance Fact Book*
 - Moody's Public Utilities Manual*
 - Reports of the National Association of Investment Companies
 - American Transit Association operating data
 - National Association of Motor Bus Operators data
 - Statistics of Class I Railroads, 1972*, Association of American Railroads
 - Trinc's Blue Book of the Trucking Industry*, Dun and Bradstreet, Inc.
 - Trends in the Hotel-Motel Business*, Harris, Kerr, Forster and Co.
 - The Lodging Industry*, Horwath and Horwath
 - Cost of Doing Business Survey*, American Rental Association
 - Trends in Commercial Floriculture Crop Production and Distribution*, Marketing Facts for Floriculture, Inc.
 - Existing Homes Sales* (annual), National Association of Realtors
 - Media Records, Inc. (newspaper advertising)
 - Publishers' Information Bureau (periodical advertising)
 - Leading National Advertisers, Inc. (network TV)

Television Magazine (network TV)
Radio Advertising Bureau (radio advertising)
Outdoor Advertising, Inc. (outdoor advertising)
American Association of Advertising Agencies (inputs)
Mail-Me-Monday Business Barometer, Accounting Corporation of America
Engineering News Record
American Institute of Architects publications
National Society of Professional Engineers publications

Methodology

Agriculture (I-O 1, 2)

The initial input-output data for the agriculture sectors were prepared by the staff of the Agricultural Estimates Division of the Economics, Statistics, and Cooperatives Services (ESCS) of the U.S. Department of Agriculture. To a very large extent, receipts and expenses were derived from the regular data collection program of ESCS, which included estimates of farm output and the expenses of farm production. The procedures for compiling these statistics are described in detail in various issues of the *Farm Income Situation* published by that Department. Among the most important sources was the 1971 *Survey of Farmers' Expenditures*. This was supplemented with expenditure data from the worksheets of the Farm Product Expenditures Unit of the Economic Research Service (a predecessor of ESCS). The nonpurchased feed and seed estimates were based on the Statistical Reporting Service production and farm disposition reports. The value of manure was estimated from livestock inventory data and fertilizer nutrient value data and the value of animal workpower was estimated from the stock of horses and mules. In addition, heavy reliance was placed on the data in 1969 *Census of Agriculture* and the 1972 *Censuses of Manufactures, Mineral Industries, and Business*. For example, the Census of Manufactures provided a considerable amount of information on the consumption of specific farm products by the separate manufacturing industries.

Forestry and fishery products (I-O 3)

The commodity control total for forestry and fishery products (the total supply of products defined as primary to the industry) was estimated from several sources. The values of fishery sales and output were obtained from data collected by the National Marine Fisheries Service and the values of the wild fur catch and fur farms production were obtained from the Fish and Wildlife Service, U.S. Department of Interior. The value of sales of standing timber was established to be the same as the estimated timber purchases by I-O 20, Lumber and wood products, except containers, adjusted to exclude net sales from national forest lands. Estimates for the production of crude gums, seedlings, and other forest products were obtained from the Forest Service, U.S. Department of Agriculture. The output and sales of many of these items were available from publications such as *Agricultural Statistics*.

The major inputs for this industry were estimated from the allocations to it of the various commodities. However, several items consumed on commercial fishery vessels were estimated from data on operating costs compiled by the National Marine Fisheries Service and benchmarked to the 1967 *Census of Commercial Fisheries*.

In estimating the distribution of output, sales of fresh fish to the canned and frozen seafood industries were obtained from the *1972 Census of Manufactures*, "Materials Consumed, by Kind." Additional sales to the food and kindred products industry and to eating and drinking places were obtained from statistical reports of the U.S. Department of Agriculture and the National Restaurant Association. Sales to each of the other I-O industries, including shells for buttons, exports, etc., were based on the estimates of purchases by the consuming industries or from foreign trade data.

For forest products, sales for stumpage were based on consumption data for the lumber and wood products industry. Remaining sales of forest products, such as Christmas trees, seedlings for reforestation, etc., were allocated to consuming industries on the basis of the description of the individual products.

Agricultural, forestry, and fishery services (I-O 4)

The output control total for agriculture, forestry, and fishery services was obtained by estimating separately the value of the various services that comprise the commodity. Totals for agricultural services in 1972 were derived by interpolation between *1969 and 1974 Censuses of Agricultural Services*. Forestry services were estimated by blowing up Unemployment Insurance (Labor Department) payrolls, using a receipts to payroll ratio developed from IRS *Statistics of Income*.

Certain material inputs for this industry were likewise available from the Census of Agricultural Services. Selected Department of Agriculture publications supplemented this information.

Most of the agriculture and forestry services were assigned as costs to the agriculture industries on the basis of descriptions of the services. For the remaining services, allocations were also made to other users, as follows: the sales of crop dusting and aerial applications services were split among agriculture, forest products, Federal Government, and State and local government, on the basis of information in FAA publications; there were substantial allocations to real estate for lawn and garden services, and to PCE for animal services.

Mining (I-O 5-10)

Estimates for the mining industries were based largely on data from the *1972 Census of Mineral Industries* for control totals and Bureau of Mines publications (especially the *1972 and 1973 Minerals Yearbooks*) for input and output distributions. The Census source provided data on total receipts for each four-digit SIC mining industry; these were subsequently aggregated to the levels defined for the I-O study. The Census-based control totals were adjusted to exclude: (1) value added by resales; (2) rental and royalty receipts; and (3) receipts from electric energy sales, and to include receipts for providing services to foreigners. The remaining portion of the commodity output total was the value of mining products made as secondary production in other domestic industries. There were also substantial imports (at domestic port value) of products comparable to those produced in the mining industries which added to the supply.

Information on purchases by the mining industries was somewhat limited. Most of the published information was contained in the *1972 Census of Mineral Industries*. These data covered information on minerals received for preparation, the consumption of fuels (by type), electric energy, steel shapes, and explosives. However, the Census information included expenditures that combined purchases on both current and capital accounts. Adjustments were made to exclude the capital purchases. A special survey of materials inputs into mining, instituted for the first time in the *1967 Census of Mineral Industries* and also included in 1972, was useful in identifying other material inputs.

Another method for determining purchases of the mineral industries (exclusive of service items) was the use of purchase patterns for the mining operations of a typical mine within a given industry. These data, collected by the Bureau of Mines, were classified by type of operation within the industry (e.g., strip, deep pit, etc.). These data were used to estimate the total consumption of specific materials by each I-O industry.

The sales of the products of mineral industries were based primarily on information contained in the *1972 Minerals Yearbook*, Bureau of Mines. This source provided use patterns for practically all minerals either in quantity or dollar terms. Information on the consumption of coal by industry (for raw material and heating purposes) was contained in the *1972 Census of Manufactures*. This source also provided information on the consumption of crude oil and bauxite by the petroleum refining and alumina industries, respectively. Gaps in the data were filled by information from trade journals and consultation with industry experts.

Construction (I-O 11, 12)

The totals for new and maintenance and repair construction were based primarily on the value-put-in-place series prepared by the Bureau of the Census (including most of the control totals for estimating the output of the 33 new and 17 maintenance and repair activities appearing in the detailed 496-industry transactions table). The levels for new construction appeared in the Census Bureau publication, *Value of New Construction Put-in-Place, 1946-75*, revised (C30-75). The levels for maintenance and repair construction for 1972 were estimated from data appearing in the July 1965 *Construction Review*, published by the Bureau of Domestic Commerce, U.S. Department of Commerce. These data were updated to 1972 by various estimating procedures, including projection of trends from earlier years, relation to new construction levels, value of existing stock of plant and other construction-in-place items, etc. The BEA estimates for oil and gas well drilling and exploration and for residential alterations and additions by tenants were added to the value-put-in-place totals for new construction.

Inputs for materials by type of construction were developed in three stages. First, estimates for each type of construction (described below) were developed independently of the others. Second, the fixed amount of each material allocated to total construction was distributed among the individual types by the patterns established in the first estimates. Third, this revised distribution was reviewed for reasonableness and adjusted to yield final estimates.

The first stage estimates of materials was based on two kinds of information. For some types of construction, previous studies indicated the amount of individual materials as a proportion of the total value of construction. For new construction, these were the *Labor and Materials Requirements* studies of the Bureau of Labor Statistics and the Office of Business Research and Analysis, and the *Highway Construction Usage Factors* of the Federal Highway Administration.

For other types of construction, information was available on the aggregate of installed costs for materials, labor, and overhead by contracting trade (masonry, carpentry, plumbing, electrical, etc.). Installed cost information was based primarily on data from the Census Bureau and Department of Agriculture, administrative reports of the Interstate Commerce Commission, Federal Energy Regulatory Commission, Federal Communications Commission, and surveys in *Engineering News Record*. The material component of the installed costs was estimated from factors derived from unpublished data of the Bureau of Labor Statistics and Department of Agriculture, Bureau of the Census, and discussions with contractors.

Service inputs, such as architectural and engineering services and equipment rental, were developed from data provided by government agencies, and the *1972 Census of Selected Services*. Other services were distributed according to the volume of construction activity.

Value added totals (and component detail) were available for contract construction from the national income and product accounts. Estimates for force account construction were derived from the previously cited sources. The force account value added was limited to compensation of employees and capital consumption allowances. Value added for each of the 50 detailed construction activities (33 new and 17 maintenance and repair activities at the 496-industry level of input-output detail) was estimated from the same detailed source materials used to estimate inputs. The compensation of employees components and capital consumption allowances were generally available directly; the data for other components were somewhat fragmentary and were estimated by use of relationships to value of output, to compensation, or to total value added.

New construction was distributed entirely to final demand. New private construction was included in gross private fixed capital formation with one small exception; construction of foreign owned embassies was allocated to exports. New public construction is a component of government purchases.

The distribution of maintenance and repair construction outputs to intermediate industries and government purchases was determined by type of construction. For example, all nonfarm residential maintenance construction was allocated to the real estate and rental industry. For nonresidential maintenance and repair construction, the distribution was based on the stock of structures in each industry weighted to reflect the average age of the stock.

All the estimates for construction activities were prepared at the full level of construction activity detail (i.e., 33 new construction activities and 17 maintenance and repair activities).

Manufacturing (I-O 13-64)

A first step in the preparation of manufacturing industry and commodity control totals was the establishment of preliminary controls for the amounts available for allocation by individual SIC industries (four-digit) or industry groups. Much of the data required was obtained directly from the *1972 Census of Manufactures*. The totals derived from the Census Bureau published sources were subjected to a number of adjustments and modifications before consolidation into I-O industry control totals. The specific industry adjustments are described in the basic definitions given for each I-O industry in appendix A. The data for the 1972 study of manufacturing industries were prepared at the 496-industry level of detail, which accords generally with four-digit SIC levels. Output controls and inputs were prepared at the 496-industry level; distributions of output were prepared in even more detail, usually at the five-digit level and often at the seven-digit level (based on the *1972 Census of Manufactures* product codes).

The following commodity adjustments to *1972 Census of Manufactures* data were made at these detailed levels: (1) exclusion of construction-type installation work by employees of manufacturing establishments, (2) addition of manufacturers' excise tax, (3) exclusion, by redefinition, of items purchased for resale without further fabrication, (4) exclusion of electric energy sales, also by redefinition, (5) exclusion of gross rents and royalty receipts, also by redefinition, (6) adjustments for net inventory depletion of primary products held outside the industry, and (7) addition of receipts from the sale of selected services to foreigners, as measured in BEA's balance of payments accounts.

Information on secondary products made by the primary industry and products of the primary industry made by others was obtained from a special tabulation prepared by the Bureau of the Census from the results of the *1972 Census of Manufactures*.

Data on comparable imports were provided in the analysis of foreign trade. These data were developed from published foreign trade commodity statistics of the Census Bureau. The comparable imports became additions to supply of the domestic commodity and were usually identified at the finest level possible, often the individual product.

The above procedures provided the initial commodity totals for each I-O manufacturing commodity. These controls included the commodity receipts of the establishments included in the primary industry, and the primary product of each industry produced as a secondary product in other industries. As stated above, comparable imports of the commodity became additions to supply.

Additional commodity shipments were added to these control totals in those industries where manufacturing activity was known to be performed in establishments that were not classified in manufacturing or mining or where estimates had to be made to cover the industries for which the Census did not canvas all small producers. As an example of the first situation, the supply of fresh meat was augmented to account for the substantial amount produced in trade. An example of the second is that the supply of logs and bolts was increased to account for the production of small timber operators who were not covered in the economic censuses. In both of these cases, the Census data on consumption were much larger than the shipments totals and this excess was added to the shipments.

The major source for the material purchases of manufacturing industries was the *1972 Census of Manufactures*. For a large number of industries, statistics were collected on detailed kinds of materials consumed. These detailed statistics accounted for about 70 percent of the total value of materials used by manufacturing plants. Additional data were collected on the cost of fuels, by type, and the cost of electric energy.

In the materials and fuels consumed statistics of the Census, data are published for categories shown as "nsk," that is "not specified by kind." The "nsk" generally represent values which were estimated by the Census Bureau staff from administrative records for establishments with less than 10 employees. Though the amounts involved were usually very small, rarely more than a couple of percent, it was necessary to estimate the composition. These "nsk" values were prorated by BEA on the basis of the reported items, on the assumption that if small establishments had reported material consumption data, their patterns would have been similar to those reported by the larger establishments.

In the *1972 Census of Manufactures* (and for the three preceding Censuses), a special study on materials consumed by the chemical industries, the machinery and metal-working industries, and some others was conducted to provide more detailed information on material consumption than is regularly published. For 1972, this additional material, collected in the MA-131 survey, was published in a special report, "Selected Materials Consumed," *1972 Census of Manufactures*, MA72(1)-5. The effect of the survey results, which covered more than 135 four-digit manufacturing industries, was to reduce the "all other materials" category for the selected industries from 62 percent of total "cost of materials, parts, containers, and supplies" to about seven percent. The materials estimated in the MA-131 survey amounted to 59 percent of cost of materials, etc., specified by kind in the Census of Manufactures (including in the total the cost of "all other materials"). In addition, 12 mineral industries were included in the MA-131 for 1972.

Furthermore, input estimates were also derived from Census of Manufactures data on product shipments. In these cases, the estimates were derived from the detailed descriptions of those items--e.g., furniture stampings were assumed to be consumed by the furniture manufacturing industry. Engineering specifications were relied on in other cases. In addition to the Census data, other government publications provided useful information--especially the *Minerals Yearbook*, Bureau of Mines; *Agriculture Statistics*, U.S. Department of Agriculture, and *Synthetic Organic Chemicals, United States Production and Sales*, U.S. Tariff Commission (now International Trade Commission).

Trade publications and technical periodicals were also important sources of data on purchases of individual commodities. These publications provided coefficients and other insight into the materials needed to manufacture specified products.

There was also extensive consultation with industry experts, both within and outside government. These contacts yielded new sources of data or provided information for the development of material requirement specifications.

A final major source of information for estimating purchases by manufacturing industries was the estimates of commodity output distribution developed for commodities of other industries. This was the essential source for almost all of the purchased services inputs into the manufacturing industries.

The sources for the distribution of sales of the manufacturing commodities were as varied as those used for the purchases. An important source of information was the materials consumed in the *1972 Census of Manufactures*. Information on exported goods was supplied in the analysis of foreign trade. These data were developed from basic foreign trade publications of the Bureau of the Census. Two Census publications, *United States Exports of Domestic and Foreign Merchandise*, 1972, FT 410, and *U.S. Commodity Exports and Imports as Related to Output*, 1972, provided information which permitted allocation at the detailed product levels.

For many products, the output could be distributed on the basis of the detailed product description. This method was used extensively in estimating sales to construction, personal consumption expenditures, and gross private domestic fixed investment. For example, boys' clothing was distributed to personal consumption expenditures, railroad locomotives to gross private domestic fixed investment, and so on.

For some products, no direct information was available, but it was feasible to allocate many such products to users in proportion to the distribution of closely related items. For example, metal plating compounds were distributed to users according to the number of metal plating workers employed in each industry, as reported in the *1972 Census of Manufactures*. Another example of this approach is the allocation to users of repair parts for metalworking machinery according to the stocks of metalworking machinery held by each industry.

The *1972 Census of Manufactures* showed, in addition to product data, information on cost of contract work and receipts for contract work done on materials owned by others. Where no other information was available, it was assumed that contract work was performed for other establishments in the same industry to the extent of the reported cost of contract work for that industry.

The above procedures resulted in estimates of some sales which were stated in producers' prices (although not including manufacturers' excise taxes) and other sales stated in purchasers' prices. All values developed from the product description method were stated in producers' prices. All values derived from Census of Manufactures materials consumed data were in purchasers' prices. It was necessary to determine the spread (margins), by component item, between the producers' and purchasers' values for each of the detailed allocations to users. The components of the spread were manufacturers' excise taxes (which have been defined to be part of the producers' value in the I-O tables), transportation margins (by mode), wholesale trade margin, retail trade margin, and wholesale and retail sales taxes which are paid by the consumer.

Manufacturers' excise taxes were normally attributed to sales according to the provision of the law. The tax was applied specifically on sales to those consumers subject to the tax at the rate and method specified in the relevant tax code. For example, the Federal gasoline tax of four cents a gallon applied only to on-highway use and was computed on the basis of gallons of gasoline consumed for that use. On certain taxes, precise data for the tax base were not available. For example, the tax on rubber tires is based on a rate of eight cents a pound for the rubber included. However, since information was not available on the weight of rubber in the tires purchased, the tax, where applicable, was allocated according to the value of tires consumed.

Information on transportation margin was available by mode, mostly at the detailed I-O industry level. The methods used to estimate the margin totals and their allocations among products are described later in the section on transportation.

The general procedure for distributing transportation margin on each commodity to the consuming I-O industry was to allocate the margin to the industry using the commodity in proportion to the value of the specific commodity used. (The allocation took into account that some of the commodity values were in purchasers' prices and others in producers' prices.) It was recognized that this procedure ignored differentials in transportation costs arising from variations in distance covered, carload vs. less than carload shipments, etc. However, information was lacking to take these factors into account in a systematic way. Nevertheless, the allocation of transportation costs to specific commodities was modified to account for special circumstances where information was available.

Wholesale margin controls were provided for each four-digit SIC product grouping. The derivation of these controls is described below in the section on trade.

The general procedure for assigning wholesale margin on the sales of a four-digit SIC commodity to the various consumers was to compute the ratio of wholesale margin to the total producers' and/or purchasers' value of the commodity. The appropriate ratio was then applied to the value of each output estimate. The implicit markup or margin rates derived from the total wholesale margin at the commodity level and the commodity's total supply at producers' or purchasers' value, respectively, were generally lower than the actual markup or margin rates. The implicit rates were lower because some of the sales did not flow through wholesalers. The available information did not permit identifying which consumers purchased directly from the manufacturer. Therefore, the procedure generally used assumed that the relative mix of the channels of distribution was identical for each consumer. For a few special cases, it was possible to find relevant information which allowed differential allocation of wholesale margins to specific consumers.

Retail margin controls were provided at the detailed I-O commodity level. The determination of what transactions would be subject to retail margins was generally based on the nature of the purchaser and what sort of products were involved. Most products purchased through retail trade were assumed to be sold to persons or to construction. These consuming groups were singled out, because persons buy preponderantly through retail outlets and many of the suppliers to construction (building materials dealers and lumber yards) are classified in retail trade. For some products, retail margins were attributed to both intermediate and final users, because of the channels of distribution (e.g., gasoline, automobile parts, farm implements).

The general procedure for assigning retail margin for each specific consumer allocation was to determine a margin rate from the value of retail sales and retail margin. This full margin rate was then applied to sales to persons. When this procedure resulted in a disproportionately high retail margin on purchases by persons, a reduced margin rate was calculated for other purchasers of the I-O commodities that were believed to purchase through retail channels. This reduced margin in effect had these industrial purchasers buy from retailers at a reduced average price.

Taxes were provided separately for (1) Federal retail excise taxes, (2) local license taxes, (3) special State and local wholesale taxes, and (4) general State and local sales taxes. These taxes were attributed to each individual transactions estimate according to the applicability of the tax law.

Upon completion of the derivation of the transportation and trade margins attributable to each sale of an I-O commodity, it was then possible, by regrouping according to purchasing industry, to arrive at the sum of the margin charges for all of the given industry's purchases of materials.

Transportation and warehousing (I-O 65)

The major elements of the gross output of this industry were estimated as follows:

- (1) *Railroad transportation.*--The output of the industry consisted of railway operating revenues as reported to the Interstate Commerce Commission by linehaul operating companies, switching and terminal companies, and the Railway Express Agency, and companies renting railroad cars. Another important source is the various publications of the Association of American Railroads. The output control also included estimates of tips received by employees and estimates of scrap generated in the railway maintenance program. Sales of meals and beverages, and tips to dining car employees, were excluded from the output of railroad transportation.
- (2) *Local and suburban transit and interurban passenger transportation.*--Estimates of operating revenues were based mainly on financial and physical operating data from the American Transit Association, the Interstate Commerce Commission, the National Association of Motor Bus Operators, and *An Analysis of Taxicab Operating Characteristics*, by the International Taxicab Association. The coverage represented by the basic estimates was extended by information obtained from trade sources, the Bureau of the Census, the Federal Highway Administration (part of the Department of Transportation), and the Department of Health, Education, and Welfare.
- (3) *Trucking, warehousing, and stockyards.*--Estimates of operating revenues for this activity were based on data from the Interstate Commerce Commission, the Bureau of the Census (especially the 1972 *Censuses of Transportation and Business* and the 1972 *Census of Selected Services*, "Nonregulated Motor Carriers and Public Warehouses,"), Internal Revenue Service published reports, and data from the U.S. Department of Agriculture. Supplementary information from the American Trucking Association was also useful. These estimates include receipts from storage of Commodity Credit Corporation stocks held by trade and manufacturing establishments.
- (4) *Water transportation.*--The ocean-foreign segment consisted of the earnings of U.S. vessels from carrying U.S. exports and U.S. imports, from carrying passengers, both U.S. citizens and foreign, plus other miscellaneous revenues. These totals were based on estimates for the transportation portion of the balance of payments accounts, prepared

by BEA, augmented by the expenditures of the Department of Defense for ocean transportation services other than for the operation of its own vessels and facilities. The receipts of foreign carriers from carrying U.S. imports and U.S. passengers were treated as comparable imports and became additions to the domestic commodity supply. The output of the domestic water transportation portion of the industry was estimated on the basis of data compiled by the U.S. Army Corps of Engineers on the physical movement of all commodities by water in domestic trade and on data relating to the revenues earned from the movement by water of commodities as reported to the Interstate Commerce Commission for the regulated portion of the industry. Services incidental to water transportation were estimated on the basis of input requirements for the operating segments of the industry and services rendered to foreign carriers. Reports submitted by carriers to the regulatory agencies and the data underlying the foreign transactions components of the national income and product accounts provided the information used to make these estimates.

- (5) *Air transportation*.--Operating revenues, excluding operating subsidies, as reported by both certificated and noncertificated carriers to the Civil Aeronautics Board formed the core of the output estimate of this segment of the industry. Estimates to cover the unregulated for-hire portion of general aviation and the fixed facilities related to air transportation were based on information from a variety of sources, including data from the Federal Aviation Administration, employment data from the Bureau of Employment Security and the Social Security Administration, and information from trade sources.
- (6) *Pipeline transportation*.--The output of this segment of the industry is defined to equal the operating revenues of oil pipelines. (Note that natural gas pipelines are excluded; they are part of the gas utility industry, I-O 68.0200). Data from reports filed with the Interstate Commerce Commission by the regulated portion of the industry were inflated to include the unregulated portion, using Bureau of Mines data relating to mileage and size of pipe employed in the total industry.
- (7) *Transportation services*.--Estimates of the gross output of this diverse segment depended on a variety of sources, including reports rendered to regulatory agencies by freight forwarders, terminal market stockyard employment data of the U.S. Department of Labor's Bureau of Employment Security and the Social Security Administration, and estimates based on input requirements of industries using these activities. Data from the National Travel Survey (part of the 1972 *Census of Transportation*) were also used.

Estimates of the consumption of materials, supplies, and services by each segment of the transportation industry were based mainly on accounting and operating reports rendered to the regulatory agencies. Information developed for the regulated portion of each segment was adapted for application to the unregulated and unreported segments of the industry. That is, detailed categories of the regulated carriers were matched as closely as possible with their counterparts in the unregulated portion of the transportation industry. Then, the input patterns of these regulated carriers was used for the matching types of unregulated carriers. In some cases, the patterns were modified to represent more closely the special characteristics of the unregulated carriers (including those not reporting).

The output of the transportation commodities was distributed as follows, using as the principal sources, *ICC Freight Commodity Statistics, Class I Railroads and Motor Carriers of Property*:

- (1) *Margins*.--These represented the cost of transportation services rendered in connection with the movement from producer to purchaser of goods involved in current production or moving into final demand. The technique used to distribute margins was, first, to associate freight revenues with the commodity carried and then to classify them according to the I-0 commodity. These margins, separately identified by transportation mode, were then distributed to the industries using the commodity, usually in proportion to the amount of the commodity used. This procedure has already been described in some detail in the section on manufacturing methodology.

Freight revenues were estimated mainly from data included in financial and operating information contained in reports of carriers to regulatory agencies. The allotment to I-0 commodities was based on freight commodity statistics on the freight charges for the physical movement of commodities (such as that contained in the U.S. Engineers publication, *Waterborne Commerce of the U.S.*), and data from the *1972 Census of Transportation*.

- (2) *Direct allocations*.--These represented purchases of transportation and related services utilized directly by the purchaser that were not involved in the spread between transactions valued in producers' and purchasers' prices. Examples are revenues from transportation of passengers, receipts from the sale of supporting services to the transportation industry itself and others, and from the sale of transport services in connection with the movement of existing property from one location to another, e.g., construction equipment, contract services in connection with retail store deliveries, etc. Passenger revenues were allocated to final demand on the basis of the detailed analyses of the final demand categories. Other direct allocations were made on the basis of the unique characteristic of the type of revenue or to satisfy a specific input requirement of a given industry.

Telephone and telegraph (I-0 66)

Data for broad categories of revenues and expenses were obtained from the Federal Communications Commission's annual report, *Statistics of Communications Common Carriers*.

Reported revenue data were adjusted to include companies not reporting to the Federal Communications Commission (FCC). Revenues from general services and licenses, reported on a net basis for individual companies, were increased to include intra-company revenues. Charges incurred in the installation of equipment (not including the cost of the equipment) were added to total output and allocated to gross private fixed capital formation.

Telephone

The broad categories of expenses reported by the FCC were further broken down using American Telephone and Telegraph Company (AT&T) data on file with the FCC.

The distribution of telephone message revenues between household and business use was based on data obtained from AT&T, which also supplied a classification of message toll revenues by major business users. This distribution was also used for allocating other toll service revenues. Directory advertising revenues were made secondary to the telephone industry and became a primary commodity of advertising (I-O 73.0200).

After making specific allocations to users on the basis of data described in the previous paragraph and from the input reports of a few industries, the remaining revenues were distributed in proportion to the number of nonproduction employees, based on the *1970 Census of Population: Occupation by Industry*. ^{1/} These data were updated to 1972 by use of industry employment growth factors, comparing 1972 with 1967 Census data for manufacturers. Some of the Census of Population classifications in the manufacturing area were broader than the industry classification in the I-O study. In these cases, the Census of Population figures were disaggregated by the use of the figures on nonproduction workers from the *1972 Census of Manufactures*.

Telegraph

The results of a usage study made by Western Union were used to allocate the company's public revenues by class of customers. The public revenues of international carriers were distributed in the same manner as telephone toll service revenues.

The FCC annual report supplied broad categories of operating expenses. Further information was obtained from the annual reports of Western Union and a few of the international carriers. The output reports of several manufacturing and service industries supplied a substantial number of the inputs.

Message revenues other than public were identified by user. Non-message revenues were partly identifiable by purchaser, and the remainder was distributed by the number of nonproduction employees in each industry.

Radio and television broadcasting (I-O 67)

The output includes net time sales for broadcast purposes, the sale of talent, program material, and services to advertisers, and miscellaneous revenues, as reported by the FCC in its annual reports on financial data for TV and radio broadcasters. Rents and royalties are excluded, by redefinition to I-O 71.0200.

Expenses by major type were available from the FCC annual financial reports and unpublished worksheet data. These were further broken down by data obtained from a selected group of radio and television stations.

The sales of time, talent, program materials, and services were made secondary to this industry and became part of the primary commodity of advertising (I-O 73.0200). Most of the remaining miscellaneous revenues were small in value and represented sales from one establishment to another within the industry.

^{1/} In areas other than manufacturing and mining, concepts similar to nonproduction employment were approximated by examining the occupations.

Electric, gas, water, and sanitary services (I-O 68)

Electric utilities (I-O 68.0100)

Total revenues for Class A and B utilities, available from Federal Energy Regulatory Commission (FERC) *Statistics of Privately-Owned Utilities*, were augmented to include the revenues of Class C and D utilities, using unpublished information from the FERC and data on the revenues of cooperatives reporting to the Rural Electrification Administration (REA), derived from the annual report of that agency.

Fuel expense by type of fuel was obtained as a product of the quantity of each type used for electric power generation, derived from information from the *Monthly Energy Review* of the U.S. Department of Energy and prices paid, obtained from the Edison Electric Institute. These aggregates were split between the private utilities and the electric utilities in the government enterprise sectors of the I-O table.

Sales of electricity by class of customer from all reporting sources (FERC, REA, and other government enterprises) were aggregated and the "residential" figure used for sales to persons. The PCE figure was arrived at by adding an estimate of "residential sales at commercial rates," to cover sales to large apartment houses assumed to be made at commercial rates, and a share of State and local sales taxes. Cost of purchased power, derived from the input analysis, was the basis for the intra-sector flow. Sales of electricity to the government sector were estimated independently in the course of the study of government purchases. For the industrial sectors, data for purchased electric energy from the *1972 Censuses of Manufactures and Mineral Industries* were used. After the deduction of a few other specific allocations, the residual amounts were distributed to the remaining industries largely on the basis of *Energy Consumption in Commercial Industries by Census Division*, by Jack Faucett Associates, supplemented by data on ownership of nonindustrial buildings, with some modifications in areas of large employment.

Gas utilities (I-O 68.0200)

Gas Facts, published by the American Gas Association, provided data on total revenues and total operating expenses. This source also provided data on sales for resale, the intra-industry flow.

The purchase of gas by utilities was assumed to be the residual after allocation of natural gas to producers of carbon black.

Gas consumption by customer class, as reported in *Gas Facts*, was used for the residential sales estimate (PCE). The remainder was distributed in much the same fashion as in the electric utilities, with gas consumed data from the 1971 Fuels Consumed Study, elevated to 1972 levels on the basis of total fuels consumed, as reported in the *1972 Census of Manufactures* and the *1972 Census of Mineral Industries*, used for industrial gas consumption. Government purchase data provided the estimates of inputs to government and the residual amount was distributed on the basis of the Jack Faucett Associates study, supplemented by data on the amount of floor space in commercial, office, and other nonindustrial buildings.

Water and sanitary services (I-O 68.0300)

The combined value of total revenues for the two major components (water and sanitary services) was available from IRS *Statistics of Income* (corporate and noncorporate). To this were added the revenues for steam generation in combination companies (SIC 493), obtained from FERC sources, and revenues of independent steam companies, from Moody's *Public Utilities Manual*. The components of the total were broken down into the subsectors: water, sanitary services, steam, irrigation, and sewerage. Sanitary services became the residual amount after other estimates were fixed.

The distribution of water output was derived as follows. Personal consumption expenditures were estimated from Census of Housing and American Water Works Association data on total gallons used by persons, converted to values by means of prices computed from data of the American Water Works Association, adjusted for the differential between private and public rates, from EPA. Manufacturing and mining consumption of water were estimated by applying an estimated price per gallon developed from American Water Works Association data, adjusted to reflect the correct public rate, to the gallons consumed data appearing in the water use survey associated with the 1972 *Censuses of Manufactures and Mineral Industries*. The residual water supply was distributed in relation to ownership of nonindustrial buildings. The distribution of the output of sanitary services rested heavily on data on pollution abatement expenditures of persons and on trade sources. The output of steam was distributed on the basis of data from individual steam producing companies. Irrigation services were allocated entirely to agriculture.

Wholesale and retail trade (I-O 69)

The following discussion deals with the two types of output: (1) margins, including the redefinition-in of gross margins from the sales of merchandise occurring in establishments other than those in trade, and (2) direct allocations. Margin output, as a commodity, also includes that from sales by government enterprises, such as liquor stores. As mentioned in the text, eating and drinking places are no longer included in retail trade and hence the margins on their sales are excluded.

(1) Margins

- (a) The control for wholesale trade margins was derived from 1972 *Census of Business* reports showing gross margins of merchant wholesalers and operating expenses of manufacturers' sales branches. These include farm assemblers. Operating expenses plus profits in wholesale trade were then adjusted to reflect redefinitions out of trade of service receipts and manufacturing activities and to include redefinitions into trade of trade activities performed by service industries and resales at wholesale of products which were not further processed by manufacturing and mining industries.

The next step was to estimate, within the calculated control total, the value of margins for individual commodities. For manufacturing, commodity margins were estimated by applying the most appropriate markup rates, selected from rates computed by kinds of wholesale business, to the flow of commodities into wholesale channels. For nonmanufactured commodities, where data

on flows into wholesale channels were lacking, margins were estimated by applying margin rates to the value of sales as shown in the commodity line sales data from the *1972 Census of Wholesale Trade*. The detailed margin estimates were then adjusted on a prorata basis to sum to the control total for wholesale margins.

The value of goods flowing into wholesale channels from manufacturing was estimated in four-digit SIC detail on the basis of data showing the percent of manufacturers' shipments entering wholesale channels, as reported in "Distribution of Manufacturers' Shipments and Sales by Class of Customer," *1967 Census of Manufactures*, and extrapolated to 1972. To this was added manufacturers' excise taxes on the basis of data from the Treasury Department. Sales from manufacturers' sales branches to other wholesalers were also estimated from class of customer data in the *1967 Census of Manufactures*.

Markup (and margin) rates were computed for each kind of wholesale business on the basis of the information for margins and value of sales as reported in the *1972 Census of Wholesale Trade*.

- (b) Unlike the Census of Wholesale Trade, the Census of Retail Trade did not provide data on margins. Retail trade margin rates were computed from published and unpublished data collected for the 1972 retail trade current business report, *Annual Sales and Purchases, Year-End Inventories and Accounts Receivable by Kind of Retail Store*, Bureau of the Census. Margins rates were derived for about 75 kinds of business. These rates were then applied to sales reported in the *1972 Census of Retail Trade*.

Margins of trading stamp redemption centers and gross income of optometrists were estimated from trade association data. Other rates were adjusted to exclude the effect of receipts for purchased meals and beverages, other services, manufacturing activity such as retail bakeries, and for resales of merchandise within the trade industry on the basis of data from the *1972 Census of Retail Trade*. Margins on merchandise sales of construction, transportation, and service industry establishments were included in retail trade by redefinition. Margins on merchandise sales of government enterprises was made secondary to the enterprise industries and primary to retail trade.

The adjusted margin rates computed for each retail business were then used to compute gross margins for retail merchandise lines. Essentially, this involved applying the most appropriate retail business margin rates to the various merchandise line sales reported in the *1972 Census of Retail Trade*. For instance, the margin for retail sales of auto fuels and lubricants was computed using the margin rate for gasoline stations, no matter where in retail these sales occurred. In some cases, it was necessary to use rates computed from trade publications and other sources, since no particular

retail business could justifiably be identified as the major seller of the product. Such a rate was computed for tobacco products. The detailed merchandise line estimates were then adjusted on a prorata basis to sum to the control total for retail margins.

Because in most cases the merchandise lines were broader than the commodity lines used in the I-0 study, the retail margins by merchandise lines were split further and assigned to the I-0 commodity lines.

- (c) The "sales taxes" included in trade margins were of four types: (1) Federal retail excise taxes on special motor fuels and imported alcohol; (2) local license taxes for sales of liquor, tobacco, and gasoline; (3) special sales taxes levied at the wholesale level by State and local jurisdictions, i.e., liquor, tobacco, gasoline; and (4) general sales taxes levied by State and local jurisdictions on retail purchases. Data were obtained from published reports by the Bureau of the Census and the Internal Revenue Service.
- (d) Customs duties were considered as collected and remitted to the government through trade channels. The total was calculated as gross receipts from customs less refunds. Data were obtained from the published reports of the Treasury Department.

The wholesale, retail, tax, and duty components of the trade margins thus identified in commodity detail were distributed in accordance with the output allocations of these commodities. The method for allocating these margins to consuming industries has already been described in some detail in the section on the manufacturing methodology.

(2) *Direct allocations and miscellaneous services*

- (a) Agents and brokers commissions reported in the *1972 Census of Wholesale Trade* were generally treated in the I-0 study as a service rendered directly to the seller of the commodity who, therefore, is assumed to pay the commission. Exceptions to this general procedure are cocoa beans, green coffee, and hides and skins, where estimates of the commission paid to agents and brokers have been included with the wholesale margins on imports. (These commissions amounted to only \$16.9 million in 1972, compared to total value of commissions amounting to \$3,743.3 million.)

The output distribution of commissions is based on the commodity line detail reported in the *1972 Census of Wholesale Trade*, indicating the kinds of commodities handled, after allowance for consumption reported by merchant wholesalers and agricultural industries.

- (b) Miscellaneous fees in connection with exports were derived from the development of data for the balance of payments statistics compiled by BEA.

Detailed intermediate inputs were based largely on commodity output distribution data; inputs were also derived from government studies, reports of trade associations, and other industry sources.

Finance and insurance (I-0 70)

The estimates for this industry were developed in three subgroups, including five component I-0 industries.

Banking (I-0 70.0100)

For commercial and mutual savings banks, output was derived from data in the annual report of the Federal Deposit Insurance Corporation; output totals for the Federal Reserve banks and the Board of Governors of the Federal Reserve System were obtained from the Federal Reserve Board annual report.

Input data were also obtained from the above sources and from a study by the New York Federal Reserve Bank, "Functional Cost Analysis, 1970 Average Banks."

The annual reports also furnished data used in distributing banking output. Banks' trust department income was apportioned between persons and business on the basis of the data in the New York Federal Reserve "Functional Cost Analysis."

The business share of trust department earnings was allocated on the basis of bonded indebtedness, on the assumption that this provided some reflection of the corporate trusts and agency service used. The allocations to personal consumption expenditures of the various banks' services other than trust services developed for the GNP accounts were used. An estimate of banks' charges for collection of utility bills was based on ratios obtained from consultation with a utility company, and a judgment estimate was made for banks' mortgage servicing charges. Residual explicit service charges to business were distributed on the basis of cash deposits held, as shown in *IRS Statistics of Income, 1972*.

Imputed service charges, the largest component of banks' output, were also distributed on the basis of cash deposits held, on the assumption that the largest depositors were the chief beneficiaries of the services for which these charges were an imputed payment. All expenses of the Federal Reserve Banks were charged to banking as were all expenses of the Board of Governors of the Federal Reserve System.

Finance (I-0 70.0200 and 70.0300)

Data on output for security and commodity brokers, dealers, exchanges, and services, for personal and business credit, and for holding and investment companies were taken from *IRS Statistics of Income, 1972*. The data for holding and investment companies were raised to those reported by the National Association of Investment Companies. Additions to this output control were made for National Farm Loan Association, the Production Credit Administration, and Federal Land Banks on the basis of data from the Farm Credit Administration Annual Report, and for Federal Home Loan Banks from the Federal Home Loan Bank Board. Data for savings and loan associations were available from the Federal Home Loan Bank Board, and for credit unions from Social Security Administration reports of credit union operation.

Estimates of inputs were based on data from the Internal Revenue Service, the Securities and Exchange Commission (to whom the security exchanges report annually), the U.S. Department of Agriculture, and the Commodity Futures Trading Commission. For savings and loan associations, the Federal Home Loan Bank Board *Combined Financial Statement* was used in combination with additional unpublished detail from the Board. For credit unions, an analysis of the expense detail was available from the Federal Credit Union Administration. For business and personal credit, required reports of small loan companies to State Commissioners of Banking in 10 states were used. A sample of the five largest open-end investment companies and the two largest closed-end companies reporting to the Securities and Exchange Commission provided expenses for holding and investment companies.

Estimates of personal consumption expenditures for commissions and fees and investment counseling were based on data compiled by the Securities and Exchange Commission. Brokerage commissions and fees and investment counseling charges to mutual funds were considered to be intraindustry transactions. Commissions on U.S. Government securities were estimated on the basis of information contained in *A Study of the Dealer Market for Federal Government Securities, 1960*, by the Joint Economic Committee of Congress, and distributed by holdings of Federal Government securities, published in the *Federal Reserve Bulletin*. Flotation costs on State and local government bonds were based on information from the Investment Bankers' Association and Securities and Exchange Commission. Premiums, commissions, and fees of savings and loan associations were charged to the rental sector, since they occur in connection with home mortgaging. All the remaining output of savings and loan associations, the output of credit unions, and the imputed service charges paid to regulated investment companies were allocated to persons.

Insurance (I-O 70.0400 and 70.0500)

The gross output of life insurance companies (that is, their operating expenses) was derived from unpublished data for legal reserve companies from the Institute of Life Insurance, from data for fraternal orders from the National Fraternal Congress of America, and from data on private pension fund expenses from the Securities and Exchange Commission. Additional expense detail for legal reserve companies and fraternal orders was taken from a sample of total expenses of national companies operating in New York State (*New York Insurance Report, Volume I, Life Insurance*). All output of the life insurance carriers was allocated to consumers, either as "cost of handling life insurance" or under "health insurance."

The output of nonlife insurance carriers was derived from data in Best's *Aggregates and Averages*. Output was developed by insurance line written, to facilitate its distribution to purchasers.

Nonlife insurance carrier underwriting expenses were derived from various ratios of expenses to premiums earned, by type of company, from Best's *Aggregates and Averages*. A breakdown of loan adjustment and investment expenses was based on a sample of the largest carriers, filed in the District of Columbia Insurance Office.

Nonlife insurance carrier output was distributed by insurance line using a variety of data, some of which was fragmentary. Workmen's compensation and all accident and health insurance were allocated to consumers. Fire and other property damage insurance was broken down into categories of users on the basis of unpublished sample data from the Insurance Services Office. Fidelity and surety bonds were distributed on the basis of data from the Surety Association of America. Automobile physical damage, bodily injury, and property liability were distributed on the basis of unpublished sample data from the Insurance Services Office, New York. Marine insurance was allocated to consumers (PCE) on the basis of Institute of Marine Insurance Brokers data and to imports and to transportation by means of estimates provided by the respective industry analysts. Crop insurance was allocated to agriculture; title abstract insurance was assigned to real estate.

The output of insurance agents and brokers and combination offices was based on *IRS Statistics of Income, 1972*. Some additional information was obtained from a sample study by the Life Insurance Agency Management Association. All output of the agents and brokers and combinations was charged to the life and nonlife insurance carriers.

It will be noted that for insurance carriers (I-0 70.0400) there were several negatives in the Use table. This resulted from premiums earned exceeding losses incurred.

Real estate and rental (I-0 71)

The output control was estimated as follows: rents paid by business were obtained from the *IRS Statistics of Income, 1972*; rents paid by government from the I-0 data for government; and rents paid by persons from the GNP component of tenant-occupied residential space rent. The control total for royalty payments was derived in the following manner: royalty receipts by business were obtained from the *Statistics of Income, 1972*; receipts by persons from *IRS Individual Income Tax Returns, 1972* (adjusted upward to include depletion); receipts by government, and receipts by authors, fiduciaries, and tax exempt organizations from IRS sources. The imputed rent for owner-occupied farm dwellings was obtained from the U.S. Department of Agriculture and for nonfarm dwellings from the estimates for the GNP. The imputed rental payment by nonprofit institutions serving individuals was also obtained from the GNP data. Receipts of real estate firms for property management and from the transfer of property were based on *Statistics of Income, 1972*. It was necessary to adjust these data to exclude estimated rental receipts to avoid duplication of rents paid.

Rent and royalty receipts of business were estimated for all industries in the I-0 table from *Statistics of Income, 1972* as part of the analysis of the real estate and rental industry. These receipts were redefined into the real estate industry (I-0 71.0200).

Inputs consisted of expenses of real estate agents and brokers, derived from data of the Internal Revenue Service, and expenses developed in the NIPA's in deriving net rental income of persons from residential space rent and from farm, business, and industrial property.

The output distribution of rents is implicit in the estimates of the control totals as explained above. For royalty payments, the distributions were made to specific industries. For petroleum mining, the allocation was based on a royalty rate from the Bureau of Mines. For other minerals mining, royalty payments were published in the *1972 Census of Mineral Industries*. For phonograph record manufactures, theatrical and movie producers, radio and TV broadcasting, bands and orchestras, book music, newspaper, periodical, and greeting card publishers, and advertising, the allocations were based on estimated 1963 rates obtained from a Library of Congress article reporting on 1969 Congressional hearings on the subject. The remaining royalty payments were distributed to the manufacturing industries on the basis of their royalty receipts, on the assumption that these constituted intrasector payments for patent rights. An estimate of real estate dealers' commissions was made on the basis of the *1972 Census of Governments* data on sales by type of property and commission rates from various sources. The remainder of receipts of real estate firms was distributed on a judgmental basis.

*Hotels and lodging places, personal and
repair services (except auto) (I-O 72)*

Output estimates for Hotels, etc., (SIC 701), Trailer parks and camps (SIC 703), Personal services (SIC 72) and that part of Miscellaneous repair services (part of SIC 76) included in this industry were based on data from the *1972 Census of Business*. Merchandise sales, based on information from the *1972 Census of Business*, were redefined into trade. Similarly, service receipts arising in trade from these activities were redefined into this industry and added to the output. Gross receipts of Rooming houses (SIC 702) and Clubs, etc., (SIC 704) were estimated on the basis of data from scattered sources. The output total also includes revenue from the rental of rooms received by nonprofit institutions, such as educational institutions. Data collected by the Office of Education were used in determining room receipts of private colleges and universities.

Information on specific expenditures, particularly for SIC's 701 (Hotels, etc.) and 721 (Laundries, etc.), was available from surveys conducted by trade associations. This was supplemented by information from individual companies. For some of the other inputs, a limited amount of expense information was obtained from trade journals. The remaining inputs were obtained from the output distribution of other commodities.

The output of this industry, except for hotels and laundries and dry cleaning establishments, was allocated almost completely to personal consumption expenditures. Data from the *1972 Travel Survey* (part of the *1972 Census of Transportation*) was used to determine the allocation of hotel and motel receipts to personal consumption expenditures and to business users. Rental receipts of trailer parks were redefined to the real estate industry (I-O 71.0200). The *1972 Census of Business* reported receipts, by source, for laundries and dry cleaners; this information was used in apportioning receipts among personal consumption expenditures, intraindustry sales, and all other industries. The latter was distributed principally on the basis of the input reports of these other industries. Commercial photography receipts were treated as secondary products and made a primary commodity of advertising (I-O 73.0200).

Business services (I-O 73)

Output was based on receipts reported in the *1972 Census of Business*. Estimates of merchandise sales redefined out of the industry (and included in trade) were derived from data in the *1972 Census of Business*. Service receipts of trade establishments which were redefined into the industry were based on data from the *1972 Census of Business*.

Inputs were determined, in large part, through allocations which could be made definitively from the product descriptions in the *1972 Census of Manufactures*, e.g., film and photo paper or repair parts by type of machine, such as tractors or other farm machinery. Fragmentary data were obtained from trade associations and from some companies. Estimates from these various sources were coordinated and adjusted to cover the subsector as a whole.

Output allocations were also based largely on trade data. Sub-controls thus obtained were distributed to constituent I-O industries using relevant economic series for proration. For example, receipts for business counseling services (except interior decorating), telephone answering services, temporary office help services, special stenographic service, and duplicating services were prorated to industries on the basis of the number of their clerical and sales workers or a similar series.

The leasing and rental of heavy equipment was broken down by the identification of type of equipment. For example, leasing of construction and mining equipment could be identified and allocated specifically to the appropriate industry.

Advertising (I-O 73.0200)

The industry control total was the value of receipts of Advertising (SIC 731), derived from data in the *1972 Census of Business*. The commodity total also includes, as primary products of advertising, the receipts from advertising activities of I-O industries 26, 64, 66, 67, 72, and 76. These were derived from Census information, except for those from industries 66 and 67, which were based on data from the Federal Communications Commission.

Advertising commodity totals were established for each type of media from the Census source. Each total was then distributed on the basis of data from the following sources: the newspaper total was distributed according to data in Media Records, Inc.; the periodical total by information from the Publishers' Information Bureau; network TV was based on Leading National Advertisers, Inc., and *Television Magazine*; spot TV was based on Television Bureau of Advertising; spot radio advertising used information from Radio Advertising Bureau; outdoor totals were based on Outdoor Advertising, Inc.

The output of local newspaper advertising, excluding an estimated amount spent by individuals for classified advertising, and of local radio and television advertising was distributed primarily among wholesale and retail trade and service industries, based on the input analyses of these industries.

The estimates of intermediate expenditures were based in large part on information supplied by the American Association of Advertising Agencies.

Miscellaneous professional services (I-O 73.0300)

Output of legal services and architectural and engineering services was derived from the *1972 Census of Selected Services*, and the output of accounting and auditing and other professional services was based on data from *IRS Statistics of Income, 1972*. Substantially all of the noncorporate receipts of SIC 8999 (Miscellaneous services, n.e.c.) was assumed to be royalty receipts of authors, song writers, etc.; these were redefined to the real estate industry (I-O 71.0200).

Expenditure data for engineers and architects were based on data from Case and Co., Cleveland, Ohio. Inputs for the other professions in this group were obtained largely from the output allocations of various commodities, although some data on broad expense categories were available for items such as office supplies and office maintenance.

Allocations of miscellaneous professional services to consumers were based on data from the *1972 Census of Business* and information from professional associations. Allocations to exports, construction, and government were estimated in measuring the purchases by these categories. The remainder of legal and accounting services was allocated to mining, manufacturing, and other industries on the basis of data on non-production workers from the *1970 Census of Population*. These data were updated to 1972 by use of industry employment growth factors, comparing Census data for 1972 with data for 1967. The remaining output of engineering and architectural services was allocated to mining and manufacturing on the basis of number of production workers, from the *1972 Censuses of Manufactures and Mineral Industries*.

Eating and drinking places (I-O 74)

Eating and drinking places were established as a new industry for the 1972 I-O table. Food and beverage sales in eating and drinking places were derived primarily from the *1972 Census of Retail Trade, Merchandise Line Sales*. Tips and sales taxes are included in output. Since the industry is essentially an activity, the output includes all domestic meal and beverage sales occurring in railroad dining cars, motels and hotels, on airline flights, in bowling alleys and billiard parlors, from vending machines, etc. The only item excluded is overseas sales of food and drink by Federally-operated post exchanges (civilian or military).

Sales by railroad dining cars were derived from the data on railroad operations; similarly, sales of meals and drinks by water transportation, by marinas, by air transportation (drinks only), by hotels and motels, by amusement parks, by motion picture theaters, etc., were all derived in preparing the output estimates for each of these industries.

Detailed estimates of the types of food going through eating and drinking places were derived from a USDA report, *Survey of the Market for Food Away from Home*. Other input data were derived from industry publications and other USDA data on food consumption. Approximately 75 percent of the output of the commodity was allocated to PCE, about 24 percent represented private industry purchases, and the rest went for food catered to hospitals and airlines. These allocations were based in part on information derived in the 1967 study of retail trade.

Automobile repair and services (I-0 75)

Output totals were calculated in several components. The *1972 Census of Selected Services* was used to derive the service receipts of auto repair shops, of auto rental and parking establishments, and of other auto service establishments. Merchandise sales, which were redefined into trade, were estimated on the basis of 1972 Census data. Service receipts of trade establishments were redefined into this industry. The *1972 Census of Business* reported sales of service labor and parts used in repair performed by trade establishments. IRS *Statistics of Income*, 1972 data provided information on other receipts, excluding rents and royalties, to be added in order to arrive at the total output of the industry.

Many of the inputs for auto repair were taken from the estimates of output allocations of the various commodities. In addition, it was possible to develop from *1972 Census of Business* data the total cost of parts used in repair. Inputs of repair parts of the auto rental industry were based on the number of vehicles owned by such firms.

The purchase of automobile repair and services was based on estimated mileage for business and consumer purposes. Data on auto stock distribution available from BEA special studies provided a breakdown of the number of automobiles operated by businesses and households. Total passenger car mileage excluding government, reported by the Federal Highway Administration, less business-owned car mileage provided the estimate of total household-owned auto mileage. Average business-owned car mileage was obtained from an auto-leasing company. The business mileage of each household-owned auto used for business purposes was estimated at approximately 57 percent of the mileage of the average business-owned auto.

Truck repair was distributed on the basis of a series for total truck mileage, and then adjusted to exclude, by industry, self-performed maintenance. The *1972 Truck Inventory and Use Survey* supplied data on total truck mileage as well as mileage data for trucks used for personal transportation and 10 other major use classes. Data for estimating self-performed maintenance were developed from data in the *1972 Truck Inventory and Use Survey*. In estimating PCE truck repair, personal transportation mileage was weighted by one and the remaining mileage weighted by two, on the assumption that the cost of repair of pickup trucks, which constituted the major portion of trucks in the personal use category, was considerably less than the repair costs of heavy trucks. For the other major use categories, mileage data were broken down by industry, where necessary, using data on the number of drivers, delivery men, and route men, by industry from the *1970 Census of Population*. Truck leasing, allocated entirely to business, was distributed on the basis of the series developed for truck use described above.

Estimates of auto repair purchased by agriculture, transportation, and government were obtained from the input analyses of these industries. The remaining amount of repair purchased by business was distributed by a series on passenger car mileage developed from a variety of sources, principally Bureau of Public Roads (later Federal Highway Administration) data on number of cars in use and the *1970 Census of Population: Occupation by Industry*. The mileage figures by industry were adjusted to exclude owner maintenance mileage, using the same ratios which were derived for purchased versus owner-performed repair for trucks.

Amusements (I-O 76)

The control total was the sum of estimated service receipts of establishments in Motion picture theaters and services (SIC 78, except 7813 and 7814) and Amusements (SIC 79), as reported in the *1972 Census of Business*, plus the service receipts from amusements produced commercially but not covered by the Census, such as certain nonprofit theatrical and music groups, college football, and other amateur spectator sports. These added receipts were obtained largely from trade sources.

The *1972 Census of Business* reported a breakdown of receipts between admissions and merchandise sales for SIC 78 and commercial spectator sports. For the other amusements (SIC 79), merchandise sales were also estimated on the basis of data from the *1972 Census of Business*. The margins on the total merchandise sales were redefined into trade.

A major share of the expense items for SIC 78 was obtained from Census data. Very little information was available on purchases by SIC 79. It was necessary to rely on the distributions of the various commodities.

Estimated admission receipts were allocated to personal consumption expenditures, except for a minor portion which was allocated to business use. The remaining output consisted principally of transactions among motion picture theaters, producers, and distributors.

Medical, educational, and nonprofit organizations (I-O 77)

The control total for Veterinarians, etc. (SIC 0722) and Medical services (SIC 80, excluding nonprofit hospitals) was based on Internal Revenue Service gross receipts data, adjusted to exclude receipts of independent optometrists, which are included in retail trade (I-O 69.0200). The output of nonprofit organizations was measured in terms of current operating expenditures, including depreciation, in accordance with national accounts conventions. Estimated current operating expenditures of nonprofit hospitals and income of proprietary hospitals were derived from American Hospital Association data. Office of Education data formed the principal basis for estimates of operating expenditures for Schools (SIC 821) and Universities, etc. (SIC 822). For estimating operating expenditures of the remaining nonprofit organizations, many private association sources were used. Depreciation charges were based on estimates included in the GNP statistics.

Data from a survey conducted by *Medical Economics* were useful in estimating some of the more important expenditure items of physicians. The results of a survey conducted by the American Dental Association were useful in supplying expenditures of dentists.

Estimated purchases of materials and services by hospitals were based on a study made by the Hospital Association of New York. Estimates for nursing homes were based on data from the National Nursing Home Survey conducted by the Department of Health, Education, and Welfare. Inputs to private educational institutions were derived from Office of Education data.

The output analyses of other commodities provided the base for estimates of expenditures by the remaining component of this industry.

All but a minor portion of the total commodity output of this industry was allocated to personal consumption expenditures. There were some sales and purchases among the various components of the medical and other health services industry, as well as allocations of a portion of medical and health services to Federal and State and local governments, based on data from the Department of Health, Education, and Welfare. The output of business associations (SIC 861) was distributed on the basis of nonproduction workers in each industry, developed from the 1970 *Census of Population*. These data were updated to 1972 by use of employment growth factors derived from data of the Census Bureau, comparing 1972 and 1967. For I-O 77.0400, research and development services were sent largely to governments, while most educational output was sent to PCE.

Government enterprises (I-O 78 and 79)

The principal sources for the output measures of Federal Government enterprises were the annual *Budget of the United States*, the Treasury Department's *Combined Statement of Receipts and Expenditures*, and the monthly *Treasury Bulletin*. Outputs for State and local government enterprises were derived from compilations of State and local government budgetary data, mainly from the Census Bureau's *Census of Governments and Government Finance* series.

The Commodity Credit Corporation inputs were developed from its annual *Report of Financial Condition and Operations* and unpublished quarterly data underlying this publication. The inputs for the Postal Service and other Federal Government enterprises were developed from published annual reports of the respective agencies and from the *Appendix to the Budget of the United States*. Value added estimates were obtained from worksheets of BEA's National Income and Wealth and Government Divisions. The NIWD data on employee compensation were obtained originally from the Civil Service Commission and other sources. The current surplus of government enterprises was derived by the BEA's Government Division from reports of the Treasury Department (mainly the *Treasury Bulletin* and *Combined Statement of Receipts, Expenditures, and Balances*) and the *Appendix to the Budget of the United States*.

Most of the inputs for State and local government enterprises were developed from a sample of State and local budget documents. However, the inputs for electric utilities represented a combination of information on privately-owned utilities and publicly-owned utilities provided by the Federal Energy Regulatory Commission. The inputs for gas utilities were a combination of the pattern of inputs for the privately-owned companies and data for all utilities contained in the annual *Gas Facts* publications of the American Gas Association.

About 78 percent of the output of State and local enterprises and 19 percent of the output of Federal Government enterprises were defined as secondary to the enterprise industries and became part of the commodity output of private industries (e.g., I-O 68.0100). Most of the remaining Federal Government enterprises' receipts were those of the Postal Service. Information on the industrial sources of these receipts was obtained from published and unpublished material of that agency.

Imports (I-O 80 and 95) and exports (I-O 94)

Six sources of information provided the bulk of the data required for these areas of the I-O table. Five of these sources are publications of the Bureau of the Census, as follows:

FT 210 - *U.S. Imports for Consumption and General Imports, SIC-Based Products and Area, 1972 Annual*

FT 246 - *U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country, 1972 Annual*

FT 410 - *Exports--Schedule B, Commodity and Country, December 1972*

FT 610 - *U.S. Exports of Domestic Merchandise, SIC-Based Products and Area, 1972 Annual*

Commodity Exports and Imports as Related to Output, 1972-1973

In addition to these sources, data were obtained from the balance of payments accounts of BEA. Most of the needed information appears in the *Survey*, selected issues.

From these materials, it was possible to regroup the detailed commodity statistics into the I-O comparable and noncomparable commodity categories. Margins were calculated as indicated in the methodology on transportation and trade.

Scrap, used, and secondhand goods (I-O 81)

The output for this commodity category was derived as the sum of scrap and used goods currently produced by domestic industries. To this was added imports of the same items. The principal sources of information on these items were the economic censuses, the Census Bureau's data on imports, and reports of various Federal agencies, particularly the Bureau of Mines. Estimates of the sale and purchase of used and secondhand items were derived from a special report by the Department of Defense, from State and local government reports, from trade association publications, from the 1972-73 *Consumer Expenditure Survey* of BLS, and from estimates for the personal and investment components of the GNP accounts.

The output distribution was based largely on the input requirements of using industries for specific kinds of scrap and information in trade journals.

Special industries (I-O 82-85)

These industries have been discussed in detail in the text. All of the data are derived from the NIPA's.

Personal consumption expenditures (I-O 91)

The data for this final demand component were prepared as part of the estimates of the distribution of output for each of the commodities, as discussed through this appendix in each industry/commodity presentation. The single most useful source was the product descriptions in the 1972 *Census of Manufactures*.

Gross private domestic fixed investment (I-O 92)

The largest item of gross private domestic fixed investment, new construction, was developed from output of the new construction industry. Additional entries in the capital account associated with private buildings are the sales from I-O 71.0002, Real estate, representing commissions on the sale of new and used buildings; part of the sales from I-O 61.0602, Mobile homes; and part of the entry in the scrap, used, and secondhand goods row, representing the net sale to business of existing buildings.

With one exception, all other components of the gross private domestic fixed investment column refer to expenditures for equipment. The single exception is the capitalized cost of installation of communication equipment.

The first step in estimating the investment in equipment was to identify those products to be included in capital equipment. These products had to meet three criteria: last more than one year; not be defined as part of construction; and their purchase be charged under normal industry accounting procedures to a capital account. The detailed product descriptions provided in the *1972 Census of Manufactures* were used to identify the capital equipment. In addition, information was obtained from industry experts and tax consultants. The total supply of the identified products was determined and the excess of the supply over sales to exports, government, persons, and inventory change provided the basis for the estimate of gross private domestic fixed investment.

Change in business inventories (I-0 93)

Change in business inventories should measure the value (in current prices) of the change in the physical volume of inventories held by business. Instead, each entry in the inventory change column represents the change in book value of inventories held. However, the change in book value of inventories held is converted to the change in business inventories by means of the inventory valuation adjustment, which appears as a single entry in row 85, within the inventory change column. The all-industry total for the net change in business inventories is identical with that in the NIPA's. For I-0, the inventory change for each commodity consists of the total change in the book value of inventories of the commodity no matter where they are held.

The net inventory change of manufacturing industries for finished goods, work-in-process, and materials was derived from the *1972 Census of Manufactures*. The change for finished goods and work-in-process inventory was attributed to the products primary to the industry. The individual materials included in the materials inventory of manufacturing industries were derived by assuming the materials inventory consisted of the material purchases of the holding industry. The change in inventory of these materials was then included with the inventory change of the respective commodity and excluded from the inventory change of the industry holding these materials.

The controls for the inventory change in the nonmanufacturing industries were the same as those of the estimates for the GNP components. Products included in the inventory change of trade were derived in the following manner. Changes in inventories for wholesale and retail trade, by kind of business, were developed using Census Bureau data. These inventory changes, which were all assumed to be finished goods, were attributed to the commodity on the basis of the merchandise line sales by each kind of business and a commodity flow analysis. Entries in the net inventory change column for I-0 65 (Transportation and warehousing) and I-0 69 (Wholesale and retail trade) are sums of margins on goods which were added to or removed from inventory.

Government purchases of goods and services (I-0 96-99)

The Budget of the United States and the Treasury's *Combined Statement of Receipts, Expenditures, and Balances* are the principal sources for the estimates of the total value of Federal Government purchases. The estimates of the total value of State and local government purchases were based primarily on local government budget data compiled by the Bureau of the Census in the *Census of Governments and Government Finances*.

Data on government payments for compensation of employees and purchases of new construction and other goods and services are compiled regularly as part of the NIPA's, which provided the needed control totals. It was necessary then to estimate the further break of Federal purchases of goods and services according to the I-O commodity categories, and by government function. The principal sources were information from the 1967 *Census of Manufactures* on sales by class of customer extrapolated to 1972, various issues of the *Current Industrial Reports* of the Bureau of the Census, the Census Bureau's *Shipments of Defense-Oriented Industries*, (MA-175), and the Department of Defense, *Military Prime Contract Awards by Service Category and Federal Supply Classification*. The Federal Budget and other agency reports and documents were used as supplemental data sources, especially to estimate purchases from the nonmanufacturing industries by agencies other than the Department of Defense. Published reports of the National Science Foundation, the General Services Administration, and the Commodity Credit Corporation were used to determine the purchases of research and development, the additions to strategic materials stockpiles, ADP equipment rental and capital purchases, changes in the motor vehicle fleet (inventory and rental), and the cost of farm price support operations.

State and local government purchases of goods and services other than employee compensation and construction were obtained principally from budget statistics from a sample of State and local government jurisdictions. These data were compiled by functional categories and then adjusted to control totals for each of these functions as derived from Bureau of the Census data. These estimates were supplemented by other published information, primarily from the Department of Health, Education, and Welfare and the Department of Agriculture.

To the extent possible, estimates of government purchases of goods and services, both for Federal and for State and local, were reconciled with the measures in the GNP. For 1972, the differences were very small and applied only to State and local government.

APPENDIX C—Industry Classification of the 1972 Input-Output Tables¹

The titles in bold face represent the groupings of industries used for the summary version of the 1972 tables.

Industry number and title	Related Census-SIC codes (1972 edition)	Industry number and title	Related Census-SIC codes (1972 edition)
AGRICULTURE, FORESTRY, AND FISHERIES			
1 Livestock and livestock products			
1.0100 Dairy farm products.....	0241, pt. 0191, pt. 0259, pt. 0291	11.0106 New hotels and motels.....	pt. 15-17
1.0200 Poultry and eggs.....	025 (excl. 0254 and pt. 0259), pt. 0191, pt. 0219, pt. 0291	11.0107 New dormitories.....	pt. 15, pt. 17
1.0301 Meat animals.....	021 (excl. pt. 0219), pt. 0191, pt. 0259, pt. 0291	11.0201 New industrial buildings.....	pt. 15-17
1.0302 Miscellaneous livestock.....	027, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0202 New office buildings.....	pt. 15, pt. 17
2 Other agricultural products			
2.0100 Cotton.....	0131, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0203 New warehouses.....	pt. 15, pt. 17
2.0201 Food grains.....	pt. 011, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0204 New garages and service stations.....	pt. 15, pt. 17
2.0202 Feed grains.....	pt. 011, pt. 0139, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0205 New stores and restaurants.....	pt. 15, pt. 17
2.0203 Grass seeds.....	pt. 0139, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0206 New religious buildings.....	pt. 15, pt. 17
2.0300 Tobacco.....	0132, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0207 New educational buildings.....	pt. 15, pt. 17
2.0401 Fruits.....	pt. 017, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0208 New hospital and institutional buildings.....	pt. 15, pt. 17
2.0402 Tree nuts.....	0173, pt. 0179, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0209 New other nonfarm buildings.....	pt. 15, pt. 17
2.0501 Vegetables.....	0134, 0161, pt. 0119, pt. 0139, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0301 New telephone and telegraph facilities.....	pt. 16, pt. 17
2.0502 Sugar crops.....	0133, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0302 New railroads.....	pt. 16, pt. 17
2.0503 Miscellaneous crops.....	pt. 0119, pt. 0139, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0303 New electric utility facilities.....	pt. 16, pt. 17
2.0600 Oil bearing crops.....	0116, pt. 0119, pt. 013, pt. 0173, pt. 0219, pt. 0259, pt. 0291	11.0304 New gas utility facilities.....	pt. 16, pt. 17
2.0701 Forest products.....	pt. 018, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0305 New petroleum pipelines.....	pt. 16, pt. 17
2.0702 Greenhouse and nursery products.....	pt. 018, pt. 0191, pt. 0219, pt. 0259, pt. 0291	11.0306 New water supply facilities.....	pt. 16, pt. 17
3 Forestry and fishery products			
3.0000 Forestry and fishery products.....	081-4, 091, 097	11.0307 New sewer system facilities.....	pt. 16, pt. 17
4 Agricultural, forestry, and fishery services			
4.0000 Agricultural, forestry, and fishery services.....	0254, 07 (excl. 074), 085, 092	11.0308 New local transit facilities.....	pt. 16, pt. 17
MINING			
5 Iron and ferroalloy ores mining			
5.0000 Iron and ferroalloy ores mining.....	101, 106	11.0400 New highways and streets.....	pt. 16, pt. 17
6 Nonferrous metal ores mining			
6.0100 Copper ore mining.....	102	11.0501 New farm housing units and additions and alterations.....	pt. 15, pt. 17
6.0200 Nonferrous metal ores mining, except copper.....	103-5, pt. 108, 109	11.0502 New farm service facilities.....	pt. 15, pt. 17
7 Coal mining			
7.0000 Coal mining.....	1111, pt. 1112, 1211, pt. 1213	11.0503 New petroleum and natural gas well drilling.....	pt. 138
8 Crude petroleum and natural gas			
8.0000 Crude petroleum and natural gas.....	131, 132, pt. 138	11.0504 New petroleum, natural gas, and solid mineral exploration.....	pt. 108, pt. 1112, pt. 1213, pt. 138, pt. 148
9 Stone and clay mining and quarrying			
9.0000 Stone and clay mining and quarrying.....	141-5, pt. 148, 149	11.0505 New military facilities.....	pt. 15-17
10 Chemical and fertilizer mineral mining			
10.0000 Chemical and fertilizer mineral mining.....	147	11.0506 New conservation and development facilities.....	pt. 15-17
CONSTRUCTION			
11 New construction			
11.0101 New residential 1-unit structures, nonfarm.....	pt. 15, pt. 17	11.0507 Other new nonbuilding facilities.....	pt. 15-17
11.0102 New residential 2-4 unit structures, nonfarm.....	pt. 15, pt. 17	11.0508 New access structures for solid mineral development.....	pt. 108, pt. 1112, pt. 1213, pt. 148
11.0103 New residential garden apartments.....	pt. 15-17	12 Maintenance and repair construction	
11.0104 New residential high-rise apartments.....	pt. 15-17	12.0100 Maintenance and repair, residential.....	pt. 15, pt. 17
11.0105 New residential additions and alterations, nonfarm.....	pt. 15, pt. 17	12.0201 Maintenance and repair of other nonfarm buildings.....	pt. 15, pt. 17
		12.0202 Maintenance and repair of farm residential buildings.....	pt. 15, pt. 17
		12.0203 Maintenance and repair of farm service facilities.....	pt. 15, pt. 17
		12.0204 Maintenance and repair of telephone and telegraph facilities.....	pt. 16, pt. 17
		12.0205 Maintenance and repair of railroads.....	pt. 16, pt. 17
		12.0206 Maintenance and repair of electric utility facilities.....	pt. 16, pt. 17
		12.0207 Maintenance and repair of gas utility facilities.....	pt. 16, pt. 17
		12.0208 Maintenance and repair of petroleum pipelines.....	pt. 16, pt. 17
		12.0209 Maintenance and repair of water supply facilities.....	pt. 16, pt. 17
		12.0210 Maintenance and repair of sewer facilities.....	pt. 16, pt. 17
		12.0211 Maintenance and repair of local transit facilities.....	pt. 16, pt. 17
		12.0212 Maintenance and repair of military facilities.....	pt. 15-17
		12.0213 Maintenance and repair of conservation and development facilities.....	pt. 15-17
		12.0214 Maintenance and repair of highways and streets.....	pt. 16, pt. 17
		12.0215 Maintenance and repair of petroleum and natural gas wells.....	pt. 138
		12.0216 Maintenance and repair of other nonbuilding facilities.....	pt. 15-17
		MANUFACTURING	
		13 Ordnance and accessories	
		13.0100 Complete guided missiles.....	3761
		13.0200 Ammunition, except for small arms, n.e.c.....	3483
		13.0300 Tanks and tank components.....	3795
		13.0500 Small arms.....	3484
		13.0600 Small arms ammunition.....	3482
		13.0700 Other ordnance and accessories.....	3489
		14 Food and kindred products	
		14.0101 Meat packing plants.....	2011
		14.0102 Sausages and other prepared meats.....	2013
		14.0103 Poultry dressing plants.....	2016
		14.0104 Poultry and egg processing.....	2017
		14.0200 Creamery butter.....	2021
		14.0300 Cheese, natural and processed.....	2022
		14.0400 Condensed and evaporated milk.....	2023
		14.0500 Ice cream and frozen desserts.....	2024
		14.0600 Fluid milk.....	2026
		14.0700 Canned and cured sea foods.....	2091
		14.0800 Canned specialties.....	2032
		14.0900 Canned fruits and vegetables.....	2033
		14.1000 Dehydrated food products.....	2034
		14.1100 Pickles, sauces, and salad dressings.....	2035
		14.1200 Fresh or frozen packaged fish.....	2092
		14.1300 Frozen fruits and vegetables.....	2037-8
		14.1401 Flour and other grain mill products.....	2041
		14.1402 Cereal preparations.....	2043
		14.1403 Blended and prepared flour.....	2045
		14.1501 Dog, cat, and other pet food.....	2047
		14.1502 Prepared feeds, n.e.c.....	2048
		14.1600 Rice milling.....	2044
		14.1700 Wet corn milling.....	2046
		14.1801 Bread, cake, and related products.....	2051
		14.1802 Cookies and crackers.....	2052
		14.1900 Sugar.....	2061-3
		14.2001 Confectionery products.....	2065
		14.2002 Chocolate and cocoa products.....	2066
		14.2003 Chewing gum.....	2067
		14.2101 Malt liquors.....	2082
		14.2102 Malt.....	2083
		14.2103 Wines, brandy, and brandy spirits.....	2084
		14.2104 Distilled liquor, except brandy.....	2085
		14.2200 Bottled and canned soft drinks.....	2086
		14.2300 Flavoring extracts and sirups, n.e.c.....	2087
		14.2400 Cottonseed oil mills.....	2074
		14.2500 Soybean oil mills.....	2075

See footnote at end of appendix.

APPENDIX C—Industry Classification of the 1972 Input-Output Tables¹—Continued

Industry number and title	Related Census-SIC codes (1972 edition)	Industry number and title	Related Census-SIC codes (1972 edition)
14.2600 Vegetable oil mills, n.e.c.	2076	26.0100 Newspapers	271
14.2700 Animal and marine fats and oils	2077	26.0200 Periodicals	272
14.2800 Roasted coffee	2093	26.0301 Book publishing	2731
14.2900 Shortening and cooking oils	2079	26.0302 Book printing	2732
14.3000 Manufactured ice	2097	26.0400 Miscellaneous publishing	274
14.3100 Macaroni and spaghetti	2098	26.0501 Commercial printing	2751-2, 2754
14.3200 Food preparations, n.e.c.	2099	26.0502 Lithographic platemaking and services	276
15 Tobacco manufactures		26.0601 Manifold business forms	2782
15.0101 Cigarettes	211	26.0602 Blankbooks and looseleaf binders	277
15.0102 Cigars	212	26.0700 Greeting card publishing	2753
15.0103 Chewing and smoking tobacco	213	26.0801 Engraving and plate printing	2789
15.0200 Tobacco stemmings and redrying	214	26.0802 Book binding and related work	2791
16 Broad and narrow fabrics, yarn and thread mills		26.0803 Typesetting	2793
16.0100 Broadwoven fabric mills and fabric finishing plants	221-3, 2261-2	26.0804 Photoengraving	2794
16.0200 Narrow fabric mills	224	26.0805 Electrotyping and stereotyping	
16.0300 Yarn mills and finishing of textiles, n.e.c.	2269, 2281-3	27 Chemicals and selected chemical products	
16.0400 Thread mills	2284	27.0100 Industrial inorganic and organic chemicals	281 (excl. 28195), 2865, 2869
17 Miscellaneous textile goods and floor coverings		27.0201 Nitrogenous and phosphatic fertilizers	2873-4
17.0100 Floor coverings	227	27.0202 Fertilizers, mixing only	2875
17.0200 Felt goods, n.e.c.	2291	27.0300 Agricultural chemicals, n.e.c.	2879
17.0300 Lace goods	2292	27.0401 Gum and wood chemicals	2861
17.0400 Padding and upholstery filling	2293	27.0402 Adhesives and sealants	2891
17.0500 Processed textile waste	2294	27.0403 Explosives	2892
17.0600 Coated fabrics, not rubberized	2295	27.0404 Printing ink	2893
17.0700 Tire cord and fabric	2296	27.0405 Carbon black	2895
17.0900 Cordage and twine	2298	27.0406 Chemical preparations, n.e.c.	2899
17.1001 Nonwoven fabrics	2297	28 Plastics and synthetic materials	
17.1002 Textile goods, n.e.c.	2299	28.0100 Plastics materials and resins	2821
18 Apparel		28.0200 Synthetic rubber	2822
18.0101 Women's hosiery, except socks	2251	28.0300 Cellulosic man-made fibers	2823
18.0102 Hosiery, n.e.c.	2252	28.0400 Organic fibers, noncellulosic	2824
18.0201 Knit outerwear mills	2253	29 Drugs, cleaning and toilet preparations	
18.0202 Knit underwear mills	2254	29.0100 Drugs	283
18.0203 Knitting mills, n.e.c.	2259	29.0201 Soap and other detergents	2841
18.0300 Knit fabric mills	2257-8	29.0202 Polishes and sanitation goods	2842
18.0400 Apparel made from purchased materials	231-8, 39996	29.0203 Surface active agents	2843
19 Miscellaneous fabricated textile products		29.0300 Toilet preparations	2844
19.0100 Curtains and draperies	2391	30 Paints and allied products	
19.0200 Housefurnishings, n.e.c.	2392	30.0000 Paints and allied products	285
19.0301 Textile bags	2393	31 Petroleum refining and related industries	
19.0302 Canvas products	2394	31.0100 Petroleum refining and miscellaneous products of petroleum and coal	291, 299
19.0303 Pleating and stitching	2395	31.0200 Paving mixtures and blocks	2951
19.0304 Automotive and apparel trimmings	2396	31.0300 Asphalt felts and coatings	2952
19.0305 Schiffli machine embroideries	2397	32 Rubber and miscellaneous plastics products	
19.0306 Fabricated textile products, n.e.c.	2399	32.0100 Tires and inner tubes	301
20 Lumber and wood products, except containers		32.0200 Rubber and plastics footwear	302
20.0100 Logging camps and logging contractors	2411	32.0301 Reclaimed rubber	303
20.0200 Sawmills and planing mills, general	2421	32.0302 Fabricated rubber products, n.e.c.	306
20.0300 Hardwood dimension and flooring mills	2426	32.0400 Miscellaneous plastics products	307
20.0400 Special product sawmills, n.e.c.	2429	32.0500 Rubber and plastics hose and belting	304
20.0501 Millwork	2431	33 Leather tanning and finishing	
20.0502 Wood kitchen cabinets	2434	33.0001 Leather tanning and finishing	311
20.0600 Veneer and plywood	2435-6	34 Footwear and other leather products	
20.0701 Structural wood members, n.e.c.	2439	34.0100 Footwear cut stock	313
20.0702 Prefabricated wood buildings	2452	34.0201 Shoes, except rubber	3143-4, 3149
20.0800 Wood preserving	2491	34.0202 House slippers	3142
20.0901 Wood pallets and skids	2448	34.0301 Leather gloves and mittens	315
20.0902 Particleboard	2492	34.0302 Luggage	316
20.0903 Wood products, n.e.c.	2499	34.0303 Women's handbags and purses	3171
21 Wood containers		34.0304 Personal leather goods	3172
21.0000 Wood containers	2441, 2449	34.0305 Leather goods, n.e.c.	319
22 Household furniture		35 Glass and glass products	
22.0101 Wood household furniture	2511	35.0100 Glass and glass products, except containers	321, 3229, 323
22.0102 Household furniture, n.e.c.	2519	35.0200 Glass containers	3221
22.0103 Wood TV and radio cabinets	2517	36 Stone and clay products	
22.0200 Upholstered household furniture	2512	36.0100 Cement, hydraulic	324
22.0300 Metal household furniture	2514	36.0200 Brick and structural clay tile	3251
22.0400 Mattresses and bedsprings	2515	36.0300 Ceramic wall and floor tile	3253
23 Other furniture and fixtures		36.0400 Clay refractories	3259
23.0100 Wood office furniture	2521	36.0500 Structural clay products, n.e.c.	3261
23.0200 Metal office furniture	2522	36.0600 Vitreous plumbing fixtures	3262
23.0300 Public building furniture	2531	36.0701 Vitreous china food utensils	3263
23.0400 Wood partitions and fixtures	2541	36.0702 Fine earthenware food utensils	3264
23.0500 Metal partitions and fixtures	2542	36.0800 Porcelain electrical supplies	3269
23.0600 Blinds, shades, and drapery hardware	2591	36.0900 Pottery products, n.e.c.	3271
23.0700 Furniture and fixtures, n.e.c.	2599	36.1000 Concrete block and brick	3272
24 Paper and allied products, except containers and boxes		36.1100 Concrete products, n.e.c.	3273
24.0100 Pulp mills	261	36.1200 Ready-mixed concrete	3274
24.0200 Paper mills, except building paper	262	36.1300 Lime	3275
24.0300 Paperboard mills	263	36.1400 Gypsum products	328
24.0400 Envelopes	2642	36.1500 Cut stone and stone products	3291
24.0500 Sanitary paper products	2647	36.1600 Abrasive products	3292
24.0602 Building paper and board mills	266	36.1700 Asbestos products	3293
24.0701 Paper coating and glazing	2641	36.1800 Gaskets, packing and sealing devices	3295
24.0702 Bags, except textile	2643	36.1900 Minerals, ground or treated	3296
24.0703 Die-cut paper and board	2645	36.2000 Mineral wool	3297
24.0704 Pressed and molded pulp goods	2646	36.2100 Nonclay refractories	3299
24.0705 Stationery products	2648	36.2200 Nonmetallic mineral products, n.e.c.	
24.0706 Converted paper products, n.e.c.	2649	37 Primary iron and steel manufacturing	
25 Paperboard containers and boxes		37.0101 Blast furnaces and steel mills	3312
25.0000 Paperboard containers and boxes	265	37.0102 Electrometallurgical products	3313

See footnotes at end of appendix.

APPENDIX C—Industry Classification of the 1972 Input-Output Tables¹—Continued

Industry number and title	Related Census-SIC codes (1972 edition)	Industry number and title	Related Census-SIC codes (1972 edition)
37.0103 Steel wire and related products.....	3315	50 Miscellaneous machinery, except electrical	
37.0104 Cold finishing of steel shapes.....	3316	50.0001 Carburetors, pistons, rings, valves.....	3592
37.0105 Steel pipe and tubes.....	3317	50.0002 Machinery, except electrical, n.e.c.....	3599
37.0200 Iron and steel foundries.....	332		
37.0300 Iron and steel forgings.....	3462	51 Office, computing, and accounting machines	
37.0401 Metal heat treating.....	3398	51.0101 Electronic computing equipment.....	3573
37.0402 Primary metal products, n.e.c.....	3399	51.0102 Calculating and accounting machines.....	3574
		51.0200 Typewriters.....	3572
38 Primary nonferrous metals manufacturing		51.0300 Scales and balances.....	3576
38.0100 Primary copper.....	3331	51.0400 Office machines, n.e.c.....	3579
38.0200 Primary lead.....	3332		
38.0300 Primary zinc.....	3333	52 Service industry machines	
38.0400 Primary aluminum.....	3334, 28195	52.0100 Automatic merchandising machines.....	3581
38.0500 Primary nonferrous metals, n.e.c.....	3339	52.0200 Commercial laundry equipment.....	3582
38.0600 Secondary nonferrous metals.....	334	52.0300 Refrigeration and heating equipment.....	3585
38.0700 Copper rolling and drawing.....	3351	52.0400 Measuring and dispensing pumps.....	3586
38.0800 Aluminum rolling and drawing.....	3353-5	52.0500 Service industry machines, n.e.c.....	3589
38.0900 Nonferrous rolling and drawing, n.e.c.....	3356		
38.1000 Nonferrous wire drawing and insulating.....	3357	53 Electric transmission and distribution equipment and industrial apparatus	
38.1100 Aluminum castings.....	3361	53.0100 Instruments to measure electricity.....	3625
38.1200 Brass, bronze, and copper castings.....	3362	53.0200 Transformers.....	3612
38.1300 Nonferrous castings, n.e.c.....	3369	53.0300 Switchgear and switchboard apparatus.....	3613
38.1400 Nonferrous forgings.....	3463	53.0400 Motors and generators.....	3621
		53.0500 Industrial controls.....	3622
39 Metal containers		53.0600 Welding apparatus, electric.....	3623
39.0100 Metal cans.....	3411	53.0700 Carbon and graphite products.....	3624
39.0200 Metal barrels, drums, and pails.....	3412	53.0800 Electrical industrial apparatus, n.e.c.....	3629
40 Heating, plumbing, and fabricated structural metal products		54 Household appliances	
40.0100 Metal sanitary ware.....	3431	54.0100 Household cooking equipment.....	3631
40.0200 Plumbing fixture fittings and trim.....	3432	54.0200 Household refrigerators and freezers.....	3632
40.0300 Heating equipment, except electric.....	3433	54.0300 Household laundry equipment.....	3633
40.0400 Fabricated structural metal.....	3441	54.0400 Electric housewares and fans.....	3634
40.0500 Metal doors, sash, and trim.....	3442	54.0500 Household vacuum cleaners.....	3635
40.0600 Fabricated plate work (boiler shops).....	3443	54.0600 Sewing machines.....	3636
40.0700 Sheet metal work.....	3444	54.0700 Household appliances, n.e.c.....	3639
40.0800 Architectural metal work.....	3446		
40.0901 Prefabricated metal buildings.....	3448	55 Electric lighting and wiring equipment	
40.0902 Miscellaneous metal work.....	3449	55.0100 Electric lamps.....	3641
		55.0200 Lighting fixtures and equipment.....	3645-8
41 Screw machine products and stampings		55.0300 Wiring devices.....	3643-4
41.0100 Screw machine products and bolts, nuts, and washers.....	345		
41.0201 Automotive stampings.....	3465	56 Radio, TV, and communication equipment	
41.0202 Crowns and closures.....	3466	56.0100 Radio and TV receiving sets.....	3651
41.0203 Metal stampings, n.e.c.....	3469	56.0200 Phonograph records and tape.....	3652
		56.0300 Telephone and telegraph apparatus.....	3661
42 Other fabricated metal products		56.0400 Radio and TV communication equipment.....	3662
42.0100 Cutlery.....	3421		
42.0201 Hand and edge tools, n.e.c.....	3423	57 Electronic components and accessories	
42.0202 Hand saws and saw blades.....	3425	57.0100 Electron tubes.....	3671-3
42.0300 Hardware, n.e.c.....	3429	57.0200 Semiconductors and related devices.....	3674
42.0401 Plating and polishing.....	3471	57.0300 Electronic components, n.e.c.....	3675-9
42.0402 Metal coating and allied services.....	3479		
42.0500 Miscellaneous fabricated wire products.....	3495-6	58 Miscellaneous electrical machinery, equipment, and supplies	
42.0700 Steel springs, except wire.....	3493	58.0100 Storage batteries.....	3691
42.0800 Pipe, valves, and pipe fittings.....	3494, 3498	58.0200 Primary batteries, dry and wet.....	3692
42.1000 Metal foil and leaf.....	3497	58.0300 X-ray apparatus and tubes.....	3693
42.1100 Fabricated metal products, n.e.c.....	3499	58.0400 Engine electrical equipment.....	3694
		58.0500 Electrical equipment, n.e.c.....	3699
43 Engines and turbines			
43.0100 Steam engines and turbines.....	3511	59 Motor vehicles and equipment	
43.0200 Internal combustion engines, n.e.c.....	3519	59.0100 Truck and bus bodies.....	3713
		59.0200 Truck trailers.....	3715
44 Farm and garden machinery		59.0301 Motor vehicles.....	3711
44.0001 Farm machinery and equipment.....	3523	59.0302 Motor vehicle parts and accessories.....	3714
44.0002 Lawn and garden equipment.....	3524		
		60 Aircraft and parts	
45 Construction and mining machinery		60.0100 Aircraft.....	3721
45.0100 Construction machinery and equipment.....	3531	60.0200 Aircraft and missile engines and engine parts.....	3724, 3764
45.0200 Mining machinery, except oilfield.....	3532	60.0400 Aircraft and missile equipment, n.e.c.....	3728, 3769
45.0300 Oilfield machinery.....	3533		
46 Materials handling machinery and equipment		61 Other transportation equipment	
46.0100 Elevators and moving stairways.....	3534	61.0100 Ship building and repairing.....	3731
46.0200 Conveyors and conveying equipment.....	3535	61.0200 Boat building and repairing.....	3732
46.0300 Hoists, cranes, and monorails.....	3536	61.0300 Railroad equipment.....	374
46.0400 Industrial trucks and tractors.....	3537	61.0500 Motorcycles, bicycles, and parts.....	375
		61.0601 Travel trailers and campers.....	3792
47 Metalworking machinery and equipment		61.0602 Mobile homes.....	2451
47.0100 Machine tools, metal cutting types.....	3541	61.0700 Transportation equipment, n.e.c.....	3799
47.0200 Machine tools, metal forming types.....	3542		
47.0300 Special dies and tools and machine tool accessories.....	3544-5	62 Professional, scientific, and controlling instruments and supplies	
47.0401 Power driven hand tools.....	3546	62.0100 Engineering and scientific instruments.....	3811
47.0402 Rolling mill machinery.....	3547	62.0200 Mechanical measuring devices.....	3823-4, 3829
47.0403 Metalworking machinery, n.e.c.....	3549	62.0300 Automatic temperature controls.....	3822
		62.0400 Surgical and medical instruments.....	3841
48 Special industry machinery and equipment		62.0500 Surgical appliances and supplies.....	3842
48.0100 Food products machinery.....	3551	62.0600 Dental equipment and supplies.....	3843
48.0200 Textile machinery.....	3552	62.0700 Watches, clocks, and parts.....	387
48.0300 Woodworking machinery.....	3553		
48.0400 Paper industries machinery.....	3554	63 Optical, ophthalmic, and photographic equipment and supplies	
48.0500 Printing trades machinery.....	3555	63.0100 Optical instruments and lenses.....	383
48.0600 Special industry machinery, n.e.c.....	3559	63.0200 Ophthalmic goods.....	385
		63.0300 Photographic equipment and supplies.....	386
49 General industrial machinery and equipment			
49.0100 Pumps and compressors.....	3561, 3563	64 Miscellaneous manufacturing	
49.0200 Ball and roller bearings.....	3562	64.0101 Jewelry, precious metal.....	3911
49.0300 Blowers and fans.....	3564	64.0102 Jewelers materials and lapidary work.....	3915
49.0400 Industrial patterns.....	3565	64.0104 Silverware and plated ware.....	3914
49.0500 Power transmission equipment.....	3566, 3568	64.0105 Costume jewelry.....	3961
49.0600 Industrial furnaces and ovens.....	3567	64.0200 Musical instruments.....	393
49.0700 General industrial machinery, n.e.c.....	3569	64.0301 Games, toys, and children's vehicles.....	3944
		64.0302 Dolls.....	3942

See footnote at end of Appendix.

APPENDIX C—Industry Classification of the 1972 Input-Output Tables¹—Continued

Industry number and title	Related Census-SIC codes (1972 edition)	Industry number and title	Related Census-SIC codes (1972 edition)
64.0400 Sporting and athletic goods, n.e.c.	3949	77.0400 Educational services	82
64.0501 Pens and mechanical pencils	3951	77.0500 Nonprofit organizations	84, 86, 8922
64.0502 Lead pencils and art goods	3952	77.0600 Job training and related services	8331
64.0503 Marking devices	3953	77.0700 Child day care services	8351
64.0504 Carbon paper and inked ribbons	3955	77.0800 Residential care	8361
64.0600 Artificial trees and flowers	3962	77.0900 Social services, n.e.c.	8321, 8399
64.0701 Buttons	3963		
64.0702 Needles, pins, and fasteners	3964	GOVERNMENT ENTERPRISES	
64.0800 Brooms and brushes	3991	78 Federal Government enterprises	
64.0900 Hard surface floor coverings	3996	78.0100 U.S. Postal Service	4311
64.1000 Burial caskets and vaults	3995	78.0200 Federal electric utilities	pt. 491
64.1100 Signs and advertising displays	3993	78.0300 Commodity Credit Corporation	pt. 613
64.1200 Manufacturing industries, n.e.c.	3999 (excl. 39996)	78.0400 Other Federal Government enterprises	several ³
TRANSPORTATION, COMMUNICATION, AND UTILITIES			
65 Transportation and warehousing ²		79 State and local government enterprises	
65.0100 Railroads and related services	40, 474, pt. 4789	79.0100 Local government passenger transit	pt. 41
65.0200 Local, suburban, and interurban highway passenger transportation	41	79.0200 State and local electric utilities	pt. 491
65.0300 Motor freight transportation and warehousing	42, pt. 4789	79.0300 Other State and local government enterprises	several ³
65.0400 Water transportation	44		
65.0500 Air transportation	45	DUMMY AND SPECIAL INDUSTRIES	
65.0600 Pipe lines, except natural gas	46	80 Noncomparable imports	
65.0700 Transportation services	47 (excl. 474 and pt. 4789)	80.0000 Noncomparable imports	
66 Communications, except radio and TV		81 Scrap, used, and secondhand goods	
66.0000 Communications, except radio and TV	48 (excl. 483)	81.0000 Scrap, used, and secondhand goods	
67 Radio and TV broadcasting		82 Government industry	
67.0000 Radio and TV broadcasting	483	82.0000 Government industry	
68 Electric, gas, water, and sanitary services ²		83 Rest of the world industry	
68.0100 Electric services (utilities)	491, pt. 493	83.0000 Rest of the world industry	
68.0200 Gas production and distribution (utilities)	492, pt. 493	84 Household industry	
68.0300 Water supply and sanitary services	494-7, pt. 493	84.0000 Household industry	
WHOLESALE AND RETAIL TRADE		85 Inventory valuation adjustment	
69 Wholesale and retail trade		85.0000 Inventory valuation adjustment	
69.0100 Wholesale trade	50, 51 (excl. manufacturers' sales offices)	VALUE ADDED AND FINAL DEMAND	
69.0200 Retail trade	52-7, 59, 7396, 8042	V.A. Value added, total	
FINANCE, INSURANCE, AND REAL ESTATE		88 Employee compensation	
70 Finance and insurance ²		89 Indirect business taxes	
70.0100 Banking	60	90 Property-type income	
70.0200 Credit agencies	61 (excl. pt. 613), 67		
70.0300 Security and commodity brokers	62	91 Personal consumption expenditures	
70.0400 Insurance carriers	63	91.0000 Personal consumption expenditures	
70.0500 Insurance agents and brokers	64	92 Gross private domestic fixed investment	
71 Real estate and rental		92.0000 Gross private domestic fixed investment	
71.0100 Owner-occupied dwellings	not applicable	93 Change in business inventories	
71.0200 Real estate	65-6, pt. 1531	93.0000 Change in business inventories	
SERVICES		94 Exports	
72 Hotels and lodging, personal and repair services (except auto)		94.0000 Exports	
72.0100 Hotels and lodging places	70 (excl. dining)	95 Imports	
72.0200 Personal and repair services, except auto repair and beauty and barber shops	72 (excl. 723-4), 762-4, pt. 7699	95.0000 Imports	
72.0300 Beauty and barber shops	723-4	96 Federal Government purchases, national defense	
73 Business services		96.0000 Federal Government purchases, national defense	
73.0100 Miscellaneous business services	732-9 (excl. 7396), 7692, 7694, pt. 7699	97 Federal Government purchases, nondefense	
73.0200 Advertising	731	97.0000 Federal Government purchases, nondefense	
73.0300 Miscellaneous professional services	81, 89 (excl. 8922)	98 State and local government purchases, education	
74 Eating and drinking places		98.0000 State and local government purchases, education	
74.0000 Eating and drinking places	58, pt. 70	99 State and local government purchases, other	
75 Automobile repair and services		99.1000 State and local government purchases, health, welfare, and sanitation	
75.0000 Automobile repair and services	75	99.2000 State and local government purchases, safety	
76 Amusements		99.3000 State and local government purchases, other general government	
76.0100 Motion pictures	78	OTHER SYMBOLS	
76.0200 Amusement and recreation services	79	Outputs	
77 Health, educational, and social services and nonprofit organizations		T.1.U. Total intermediate use	
77.0100 Doctors and dentists	801-3, 8041	T.F.D. Total final demand	
77.0200 Hospitals	806	T.C.O. Total commodity output	
77.0300 Other medical and health services	074, 8049, 805, 807-9	Inputs	
		T.1.1. Total intermediate inputs	
		V.A. Value added	
		T.1.O. Total industry output	

1. The industry classification is usually identical with that for the commodity which is the primary product of the industry. However, for some industries the primary product, or a component thereof, is the same as the primary product of another industry. In such cases, commodity output is included with the industry most definitively associated with the commodity, usually the largest producer.

2. Excluding government enterprises.
3. In the 1972 SIC, government enterprise activities are generally classified with the similar private activity. In I-O, activities of enterprises are classified in groups 78 and 79 and the corresponding SIC's are shown except for 78.0400 and 79.0300, each of which includes a number of SIC's and several activities for which no comparable SIC exists.

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